



Expertech Furnace



These instructions are intended for reference only, and will *not* replace the thorough training required for proper system operation. Contact a clean room staff member with questions or to report a system problem.





CAUTION: Please be advised all furnace tubes are to be used for Front End of Line (FEOL) processes only. No metals are permitted in this tool. Additionally, wafers that have been processed in tooling that may have or has metals contamination are not permitted.

No resists or organic materials are permitted in the furnace as these will combust.

It is advisable to clean any wafers to be processed in the furnace with the standard RCA clean prior to processing in any of the furnace tubes.

DANGER! Very hot surfaces will be present when operating the furnace. Be extremely careful where you place any parts of your body as hot surfaces can cause serious injury. Product will require ample cooling time prior to achieving a temperature that can be safely handled.

There are four furnace tubes: Thermal oxide (diffusion), Anneal, LPCVD Oxide (additive), and LPCVD Nitride (additive). The Standard Operating Procedure (SOP) attempts to address all of these tubes under one procedure. However, the user will note there are some differences between the tubes. The major difference lies between the atmospheric and vacuum (LPCVD) tubes. The LPCVD tubes will require evacuation steps to achieve process conditions and vent steps to allow transfer motions.

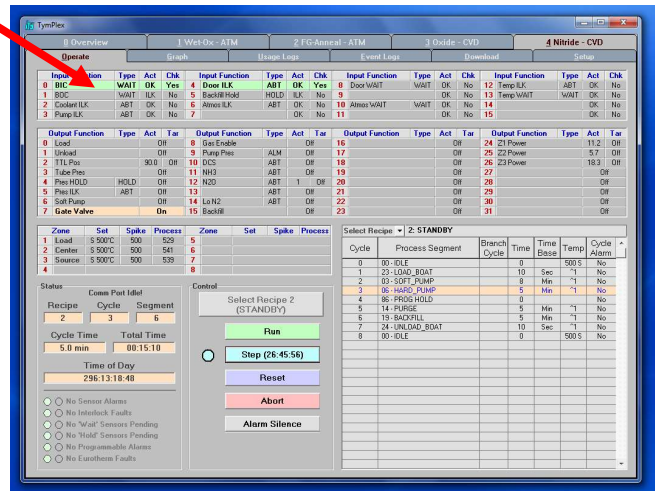
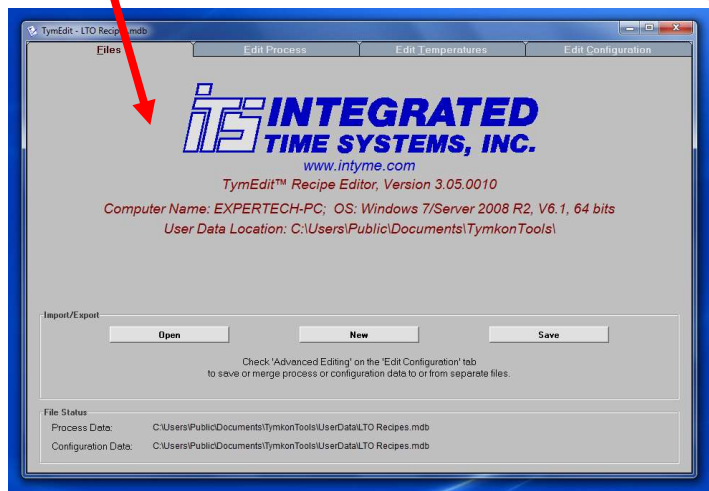
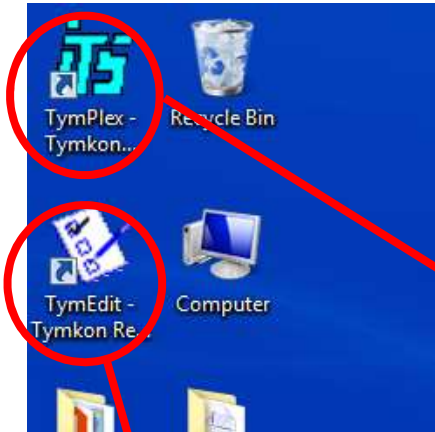




Introduction:

There are two pieces of software that are necessary to operate the furnace:

TymEdit for recipe writing and TymPlex for operations:



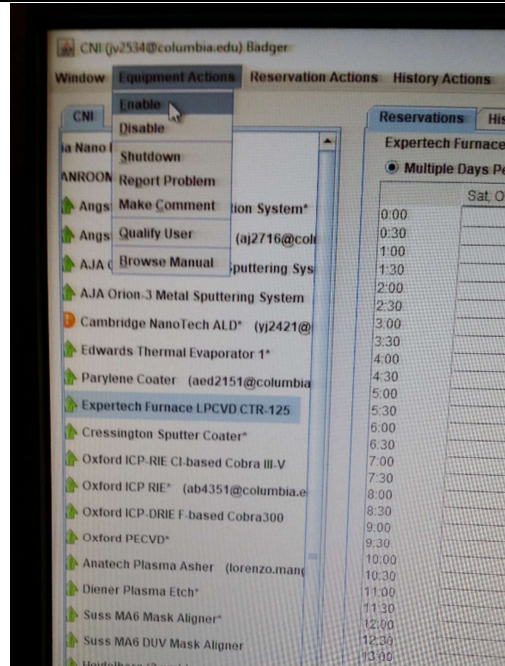
It is important that the operator is familiar with these interfaces prior to operating the tool.

The SOP begins with the transfer arm fully extended in to the tube and in standby conditions.



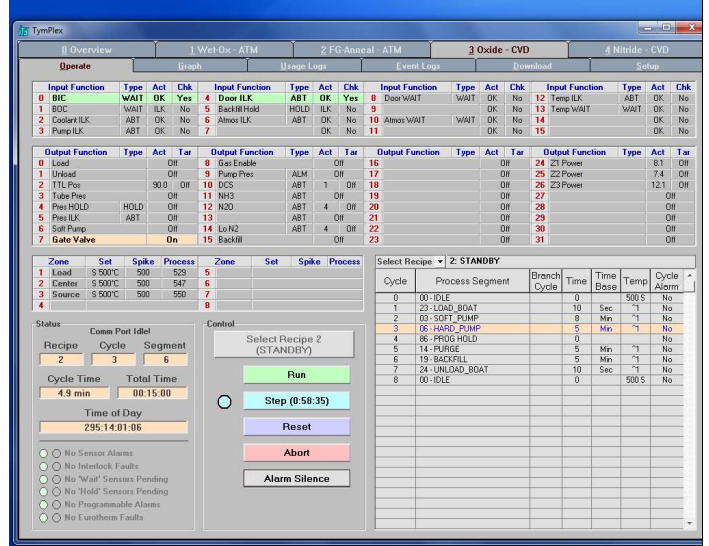


1. Enable the tool in **BADGER**



2. Verify system status

You should expect to find the system with the process paddle fully extended in to the furnace tube with the tube at standby temperature. This will vary slightly from tube to tube. Tubes 3 and 4 will be under vacuum.

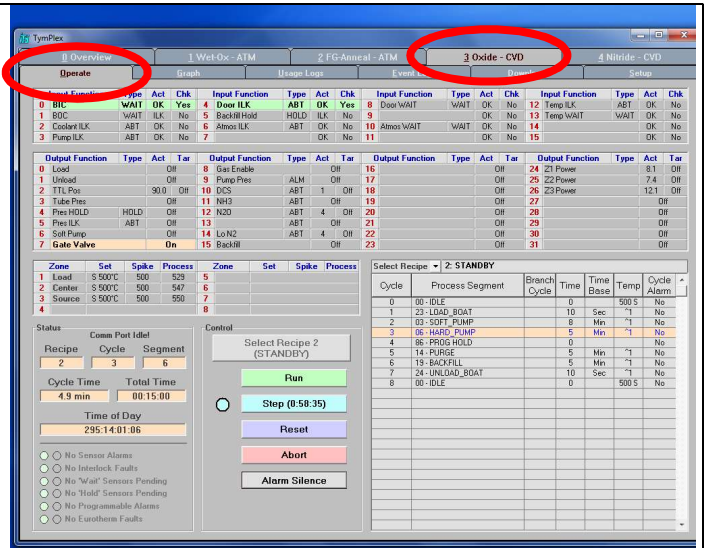




3. Exiting Standby/ Operations Ready:

From the TymPlex software, Click the tab representing the appropriate tube that you wish to operate.

Click the 'operate' tab and press the **green** 'Run' button. This will advance the Standby recipe and automatically vent the tube (as applicable) and withdraw the arm from the process tube.

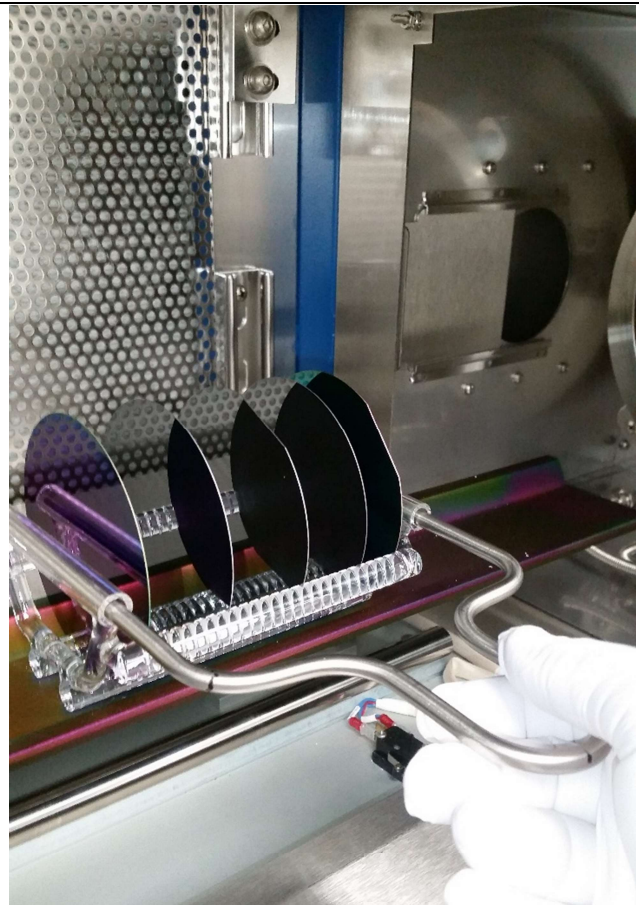


4. Loading of samples:

Samples that enter the furnace must be metal free. If there is any question, do not process.

DANGER! The process paddle will be very hot. Do not touch. Each tube has its own dedicated process boat. Do not exchange boat between tubes.

It is advisable to use 'baffle' wafers at the start and end of your wafer load. This will help with uniformity issues as caused by the directional flow of gases.





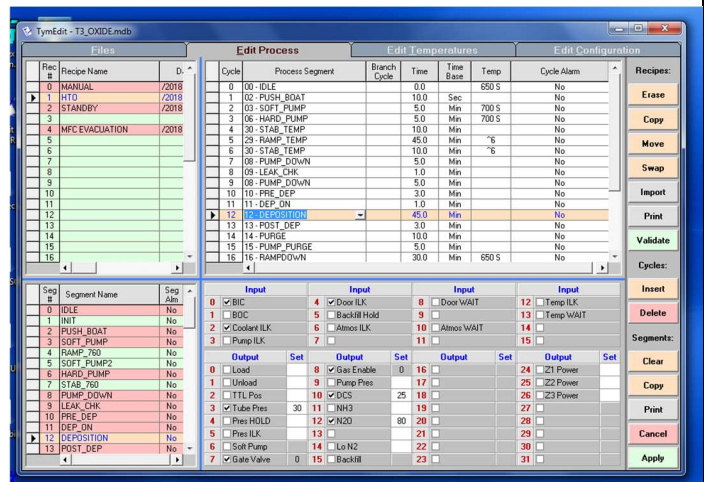
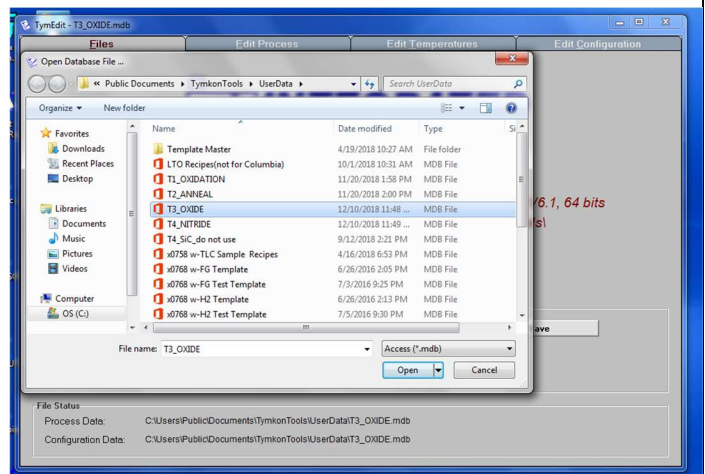
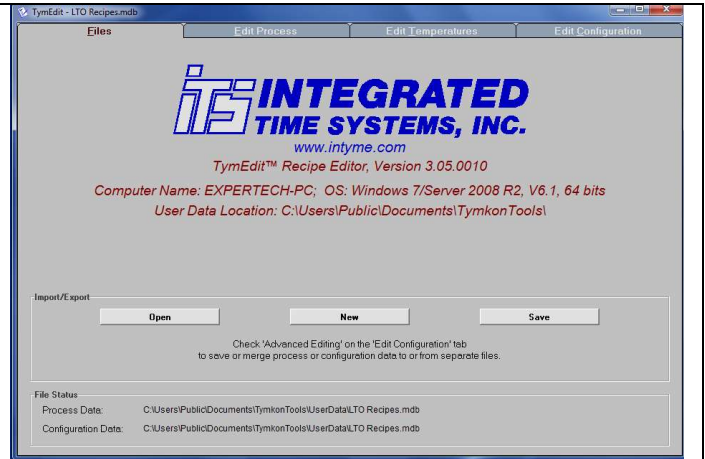
5. Editing process time: (Do not edit gas flow, tube pressure or other process parameters as these changes will affect film properties.)

In the TymEdit software, click the 'open' button and select the process file bank for the tube you are working on.

Click the 'edit process' tab and select find the process you wish to run. Find the segment titled 'Deposition'. Edit time in accordance with your process needs. Click the green 'Apply' button.

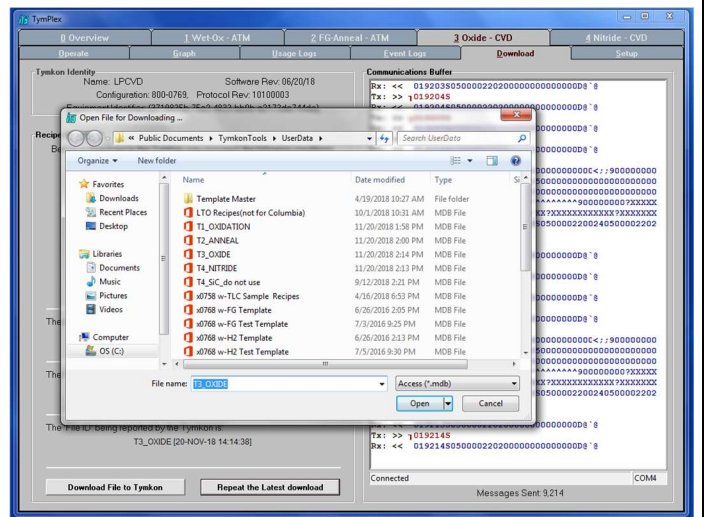
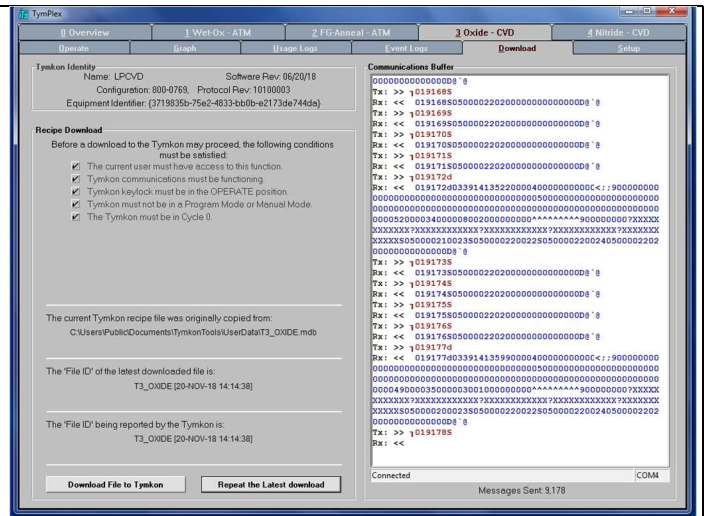
Click the 'Files' tab then click the save button.

Your process change has now been stored.

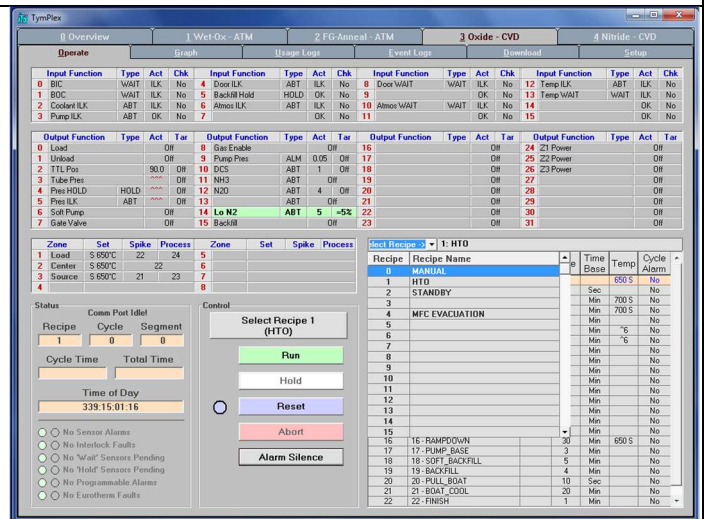




6. Downloading Process Bank from TymEdit to TymPlex:
 From the TymPlex software, Click the 'Download' tab. Then click the 'Download file to Tymkon' button. This will open a new window with a menu of available recipe banks. Select the file containing the recipe bank for the tube you wish to operate. Then click the 'Open' button. The prior window will close and Tymplex software will give indication that it is downloading the recipe bank. Wording will go from **red** to black upon download completion.

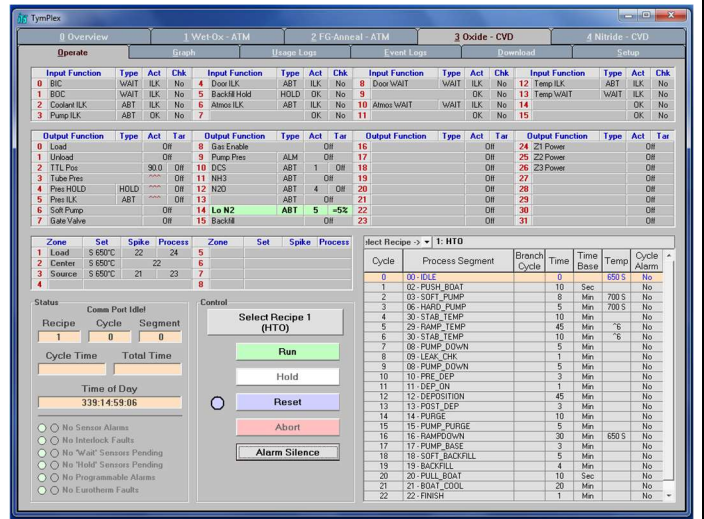


7. Selecting the Process:
 Click the drop down arrow next to the 'select recipe' wording. The available recipe bank will appear. Select the recipe you wish to run.

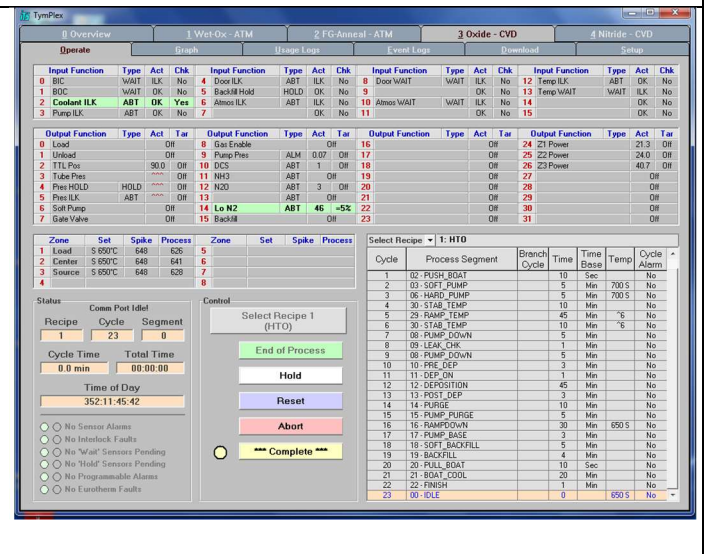




8. Starting the Process:
 In the control portion of the panel, click the Process 'Recipe button (recipe chosen in prior step)'. This will cause the recipe segment table to go from light grey to black. The process is now available to run. Click the **green 'Run'** button to begin the process.



9. Process Completion:
 A chime will indicate when the process has been completed. Click the **yellow 'complete'** button.





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Then click the **yellow** 'press to reset button'.

The screenshot shows the TMSPie software interface with several data tables and control buttons.

Input Function	Type	Act	Chk	Input Function	Type	Act	Chk	Input Function	Type	Act	Chk	Input Function	Type	Act	Chk	
0 BSC	WAIT	OK	No	4 Door ILK	ABT	ILK	No	8 Door/WAIT	WAIT	ILK	No	12 Temp/ILK	WAIT	OK	No	
1 BDC	WAIT	OK	No	5 Backfl Hold	HOLD	OK	No	9	OK	No	13 Temp/WAIT	WAIT	OK	No	OK	
2 Coolant ILK	ABT	OK	Yes	6 Almos ILK	ABT	ILK	No	10 Almos/WAIT	WAIT	ILK	No	14	OK	No	OK	
3 Pump ILK	ABT	OK	No	7	OK	No	11	OK	No	15	OK	No	15	OK	No	OK

Output Function	Type	Act	Tar	Output Function	Type	Act	Tar	Output Function	Type	Act	Tar	Output Function	Type	Act	Tar
0 Load	Off	Off	0	8 Gas Enable	Off	Off	16	16	Off	Off	24	21 Power	Off	22.3	Off
1 Unload	Off	Off	9	9 Pump Pres	ALM	0.07	Off	17	Off	Off	25	22 Power	Off	22.5	Off
2 TTL Pos	30.0	Off	10	10 DCS	ABT	1	Off	18	Off	Off	26	23 Power	Off	40.9	Off
3 Tube Pos	Off	Off	11	11 NH3	ABT	Off	Off	19	Off	Off	27	Off	Off	Off	Off
4 Pres HOLD	HOLD	Off	12	12 N2O	ABT	3	Off	20	Off	Off	28	Off	Off	Off	Off
5 Pres ILK	ABT	Off	13	Off	Off	Off	Off	21	Off	Off	29	Off	Off	Off	Off
6 Soft Pump	Off	Off	14	14 Lo N2	ABT	5	-5.2	22	Off	Off	30	Off	Off	Off	Off
7 Gate Valve	Off	Off	15	15 Backfl	Off	Off	Off	23	Off	Off	31	Off	Off	Off	Off

Zone	Set	Spike	Process	Zone	Set	Spike	Process
1 Load	5.950°C	648	625	5			
2 Coolant	5.950°C	648	628	6			
3 Source	5.950°C	648	627	7			
4				8			

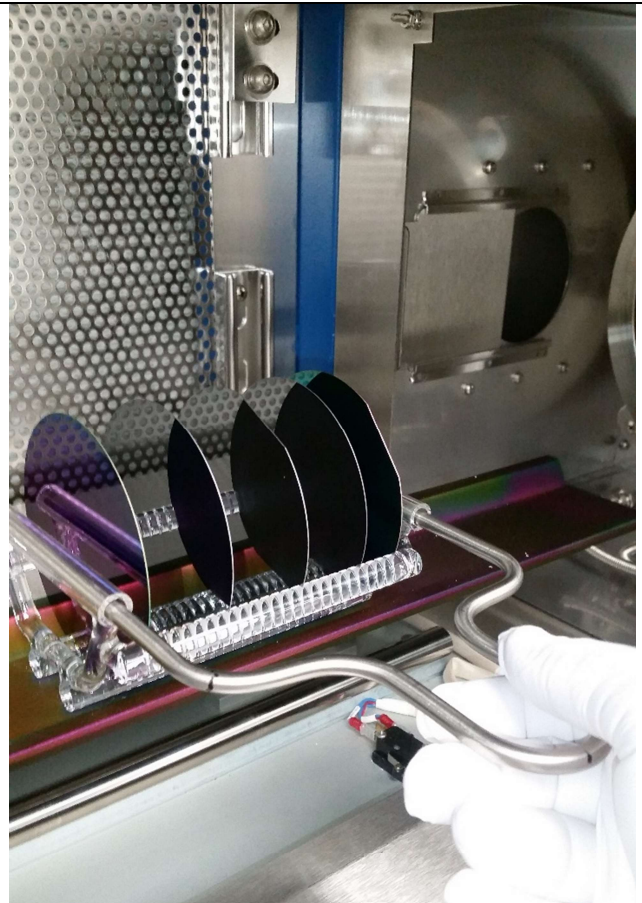
Select Recipe: 1: H10

Cycle	Process Segment	Branch	Time	Temp	Cycle
1	02: PUSH BOAT		10	Sec	No
2	03: SOFT PUMP		5	Min	700.5
3	06: HARD PUMP		5	Min	700.5
4	30: STAB TEMP		10	Min	No
5	28: RAMP TEMP		45	Min	"8
6	30: STAB TEMP		10	Min	"8
7	08: PUMP DOWN		5	Min	No
8	08: LEAK CHK		1	Min	No
9	08: PUMP DOWN		5	Min	No
10	10: PRE DEP		3	Min	No
11	11: DEP ON		1	Min	No
12	12: DEPOSITION		45	Min	No
13	13: POST DEP		3	Min	No
14	14: PURGE		10	Min	No
15	15: PUMP PURGE		5	Min	No
16	16: RAMPDOWN		30	Min	650.5
17	17: PUMP BASE		3	Min	No
18	18: SOFT BACKFILL		5	Min	No
19	19: BACKFILL		4	Min	No
20	20: PULL BOAT		10	Sec	No
21	21: BOAT COOL		20	Min	No
22	22: FINISH		1	Min	No
23	00: IDLE		0	650.5	No

Control buttons: End of Process, Hold, * Press to Reset *, Abort, Alarm Silence.

10. Retrieve Samples:
DANGER! The process paddle, wafer boat, and wafers will be very hot. Do not touch.

Allow wafers and boat to cool to a safe temperature before handling.





11. Return to Standby

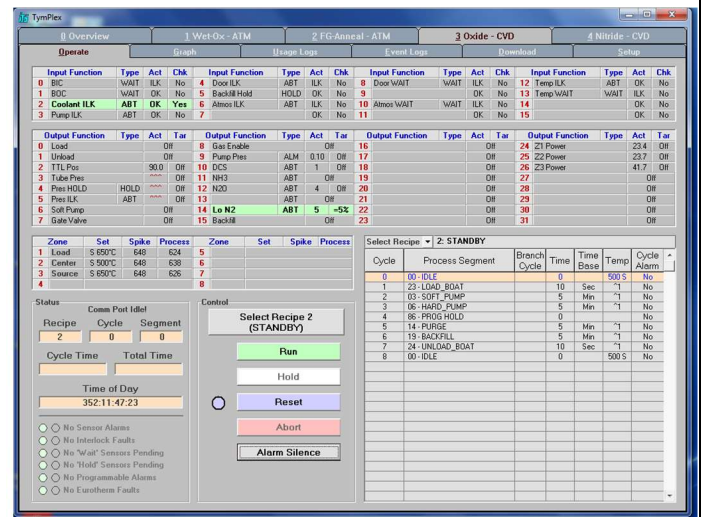
Return the tool to standby after processing. This will help keep the tool in a clean state.

Click the drop down arrow next to the 'select recipe' wording. The available recipe bank will appear. Select the standby recipe.

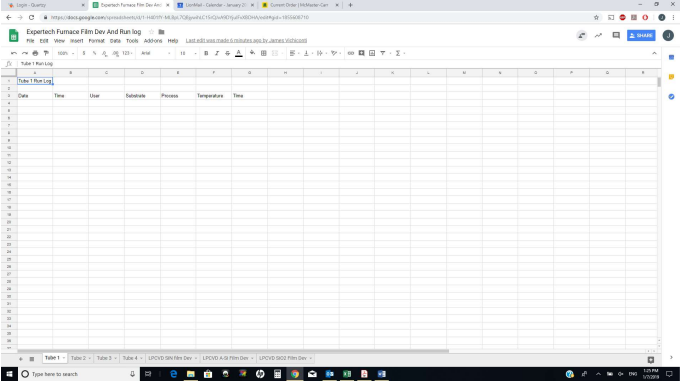
In the control portion of the panel, click the Process 'Recipe button'. This will cause the recipe segment table to go from light grey to black.

The process is now available to run.

Click the **green** 'Run' button to begin the process.





<p>12.</p>	<p>Log sheet Please record you run on the Google Sheets Log titled 'Expertech Furnace Film Dev And Run Log'. Each tube has a dedicated page</p>	
<p>13.</p>	<p>BADGER LOGOUT: Don't forget to disable the tool in badger after you're done.</p>	