ASML Job Cheat Sheet

Job Definition

<u> </u>	PAS5500 Dialogue(8.9.0) – Main Menu
Accept Exit) Help)	Print ♥) CBd Hdl Mat Hdl) Stop) Misc ♥)
	Main Menu
	0 - Exit
	1 - Start-Up/Shut-Down
	2 - Batch Control
	3 - Factory Constants
	4 - Job Definition
	5 - Miscellaneous
	6 - Test Manager
	7 – Machine Constants
	8 - SECS Manager
	. – Select Option

Select Job Definition, then select Modify Job.

Modify Job

<u></u>	1133300 Dialogue(0.3.0) Jub	Contraction (Contraction)	
Accept Cancel	Help) Print (Cad Hdl)	Mat Hdl) Stop)	_Misc ♥)
Modify Job			
Job Name : example			
<u>Select</u>			
Machine Configuratio	n		
Machine Type	: /300 - 78-Lens		
Lens Reduction	: 4x		
Reticle Size [inch]: 6		
Wafer Layout			
Туре	: SEMI		
Diameter	: 4 inch – 100.0 mm		
Notch	: N		
Flat-Edge Length	: 32.5000		
Comment	: Example job		

<u>Name</u> – type in a name for your job, then press **<Enter**>.

<u>Machine Configuration</u> – <u>Machine Type</u> should be: /300 – 78-Lens.

<u>Wafer Layout – Diameter</u> should usually be **4 inch – 100 mm**. Select Flat or Notch.

Note: these values <u>cannot</u> be changed later.

<u>Comment</u> – type in comments one line at a time, then press **<Enter**>.

Click on the Accept button on the upper Left when finished.

Wafer Layout

Cell Structure

<u> </u>	PAS5500 Dialogue(8.9.0) – Job Definition
Accept) Cancel)	Help) Print ♡) Cmd	Hdl (Mat Hdl) Stop) Misc ♥)
Cell Structure		
Dimensions		
Cell Size [mm]	X : 10.00000	Y : 10.00000
Edge Clearance [mm]	Round : 2.0000	Flat : 0.0000
Edge Exclusion	[mm] : <u>3.000</u>	
Die Definition		
Wafer Cover :	W	
Number of Dies X :	<u>1</u> Y: <u>1</u> M	inimum per Cell : <u>1</u>
Cell Matrix		
Placement Mode	: 0	
Matrix Shift [mm]	K : 0.00000 Y :	0.00000
Placement Result	Cells	Dies
Inner	57	57
Edge	0	0
Total	57	57
	1	
Preview Results	2	

The center-to-center distance between exposures, or *step size*, in X and Y is determined by <u>Cell Size</u>. Type in each distance required, then <<u>Enter</u>>. <u>Die</u> is a subset of the <u>Cell</u> and can usually be ignored.

<u>Minimum per Cell</u> – this is the minimum number of <u>Dies</u> per <u>Cell</u> required to be within the good area of the wafer as defined by the <u>Edge Exclusion</u> and can usually be ignored.

<u>Cell Matrix</u> – allows placement of the array by \underline{C} (the Computer), or \underline{O} (the Operator).

<u>Results/Stepper</u> – allows viewing of the defined array on the wafer.



Click the Accept button at the top Left when finished.

Alignment Definition

<u>▼</u> PASS	500 Dialogue(8.9.0) – Job Definition	3	PAS5500 Graphics
Accept: Exit Help P Optical and Global Alignment Wark : 1 of Wark ID : 1 Wark TD : 1 Wark Type : PM Large Edge Clearance : Y Wark Specification : C Wark Position Cell Index X Mark-to-Cell Shift [mm] X Wafer Coordinates [mm] X Wafer Coordinates [mm] X Wafer Side Suitable Alignment Gotical Prealignment Global / Fine Alignment Back Side Alignment	<pre>rint ♥) Cmd Hdl Mat Hdl Stop) 1 Variant ID : <empty> :4 @ 0.00000 Y :0.00000 :40.00000 Y :0.00000 : Left : A : Y : Y : Y : N</empty></pre>	Misc T)	Size Print DDE2019test 02062019test 1 0 -1 -2 -3 -5 -4 -3 -5 -4 -3 -5 -4 -3 -5 -4 -3 -5 -4 -3 -2 -1 0 1 2 3 4 5 Regions Note DDE2019test -5 -5 -4 -3 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5
Action <u>Apply</u> <u> </u>	Delete	New) _	
Graphics <u>Draw Wafer</u>	Draw Cell)		

Select Optical and Global Alignment.

Here you determine the location of each alignment mark on the wafer for your process. It is recommended that you place at least two marks within the dark gray areas in the display; this will allow <u>Optical Prealignment</u>.

For <u>Back Side Alignment</u> (3D-Align) you *must* use the pre-determined locations ($\pm 26.8, \pm 30.6$) and place them on the side opposite your pattern (A or B).

Marks should be etched 120nm deep for the front side, 160nm deep for the back side.

Mark ID - select PM mark.

<u>Mark Specification</u> - use \underline{W} (wafer) or \underline{C} (cell) as the method to define mark locations.

Mark Position:

Wafer allows mark location definition using Wafer Coordinates. Type in each mark coordinate, then <Enter>.

<u>Cell</u> allows mark location definition using the mouse (or Index numbers) for cell selection. Select each cell and type in each mark shift vector, then <**Enter**>. Click <u>Apply</u> for each mark, then <u>New</u> to create another mark.

Click Exit when finished.

Alignment Strategy

<u> </u>	PAS5500 Dialogue(8.9.0) – Job Definition
Accept	Exit Help Print ♥) Cmd Hdl Mat Hdl Stop Misc ♥)
Alignment	Strategy
Alignment	Strategy ID : FOUR
Wafer Ali	gnment Method : TTL
Marks	<u>Selection</u>
Number of of which	Marks to Align (m) : 4 Number of Marks Required (n) : 3 to Align (mX) : 4 of which required (nX) : 3 to Align (mY) : 4 required (nY) : 3
Action	Apply Delete) Copy
Modify	(Recipe Selection) (Alignment Data)
Strategy	Previous) Next) Select : FOUR
Report	View Alignment Strategy)_

The Alignment Strategy defines the number and locations of marks required for your process. You must name your alignment strategy. Different strategies may be used for different layers.

<u>Alignment Strategy ID</u> – type in the name of the strategy, then press **<Enter>**.

<u>Wafer Alignment Method</u> – select <u>TTL</u>.

Click Selection. A new screen will open.



On the new screen, select the marks you want to use. Click to select or unselect each alignment mark.

Click Add to use the selected marks, then click Exit.

Back on the original page, click on <u>Number of Marks Required</u>, enter the *minimum* number of marks you want to use, then press <**Enter**>.

Click Apply, then Exit, then Exit.

Image Definition



Name and indicate the size and location of each image to be exposed on your reticle.

Image ID – the name of each Image on the reticle. Type in the Image name and press <Enter>.

<u>Default Reticle ID</u> – the Barcode on the reticle. It *must* match the reticle to be used. Asterisks can be used as Wild Cards. Type in the Barcode information and press <**Enter**>.

<u>Image Size</u> – the extents in X and Y of each Image. Use Wafer scale values. Type in each value to use and press **<Enter>**.

<u>Image Shift</u> – the offset of the center of each Image from the center of the reticle. Use Wafer scale values. Type in each value to use and press **<Enter>**.

Click Apply, then New or Copy to define the next Image.

Click Exit when finished.

Image Distribution



Indicate the cell locations where you want to print each image on the wafer.

<u>Cell Index</u> – cell locations can be entered manually or selected using the mouse. Use the middle mouse button to select groups of cells.

Image ID – for each group of cells selected, select the Image to distribute from the list, then click Apply.

When finished, click Exit, then Exit.

Layer Layout

Layer Definition

<u> </u>		PAS5500) Dialogue(8.9.0) – Jo	b Definition	
Accept)	xit) Hel	p) Prir	nt ♥) _Cmd Hdl	Mat Hdl) Sto	₽) <u>Misc </u>)
Layer Definit	ion				
Number of Dev	ice Layers	: _4			
Modification	Layer				
Layer Numbe	r	: 2			
Layer ID		: UR			
Wafer Side		: <u>A</u>			
Action	(Apply)				
Layer	Previous) -	Next)	Select : 2	- UR
Layer ID	New)	-			
Layer Number	_Insert)	-	_Append)_		
Report <u>View</u>	Layer Defi	nition)	-		

<u>Number of Device Layers</u> – type in the number of *device* layers you will expose, press <**Enter**>, then click <u>Apply</u>. Alignment mark layer is Zero by default.

<u>Layer ID</u> – type in a name for each Layer, press **<Enter>**, then click <u>Apply</u>.

Click <u>Next</u> for the next Layer or <u>Exit</u> when finished.

Marks Exposure

Accept Exit Help Print V Cod Hdl Mat Hdl Stop Misc V Size Print Marks Exposure 1 Layer Nr : 0 Layer ID(s) : MARKS Combined Mark/Image Exposure : N 2 Wafer Side : A Select Mark(s) : A Mark Exposure : N : A Mark Exposure : N : A Action Add _ Replace _ Single Mark _ _ Layer Previous _ Next _ Report View Marks Exposure _ _ Report View Marks Exposure _ _ I <th>T PAS5500 Dialogue(8.9.0) - Job Definition</th> <th>PAS5500 Graphics</th>	T PAS5500 Dialogue(8.9.0) - Job Definition	PAS5500 Graphics
Marks Exposure Layer Layer Nr Layer Nr Layer ID(s) Combined Mark/Image Exposure : N Wafer Side Select Mark(s) Mark ID Wark ID Select Mark(s) Mark ID Select Mark(s) Mark ID Select Mark(s) Mark Exposure : N Variant ID Single Mark Layer Previous Next Select : 0 Marks Exposure Select for Expo Select for Expo Single Mark Layer Previous Next Select : 0 Marks Exposure	$\underbrace{\texttt{Accept}}_{\texttt{i}} \underbrace{\texttt{Exit}}_{\texttt{Help}} \underbrace{\texttt{Print}}_{\texttt{Print}} \underbrace{\texttt{Cmd}}_{\texttt{Hdl}} \underbrace{\texttt{Mat}}_{\texttt{Hdl}} \underbrace{\texttt{Stop}}_{\texttt{Misc}} \underbrace{\texttt{Misc}}_{\texttt{V}}$	Size Print
Report View Marks Exposure	Marks Exposure Layer Nr : 0 Layer ID(s) : MARKS Combined Mark/Image Exposure : N Wafer Side : A Select Mark(s) Mark ID :	Marks to be selected for Exposure
Layer <u>Previous</u> <u>Next</u> Select : <u>0 - MARKS</u> Report <u>View Marks Exposure</u> _ 3 2 1 0 -1 -2	Action Add Replace	Regions Not Selected Selected for Exposure
-3 -4 -5 -5 -5 -4 -3 - Regions None	Layer <u>Previous)_ Next)</u> _ Select : <u>0 - MARKS</u>	Exposed Marks 5 4 3 2 1 0 -1 -2 -3 -4 -5 -5 -4 -3 -2 -1 0 1 2 3 4 5 Regions None

Indicate the layers where you want to expose alignment marks.

<u>When using an alignment mark Zero layer</u>: click the <u>Mark Exposure</u> box, make sure Layer 0 is selected, then click <u>Add</u>.

Click Exit when finished.

For <u>Combined Mark/Image Exposure</u> (*not recommended*): click <u>Single Mark</u>. See next page.

Single Mark

PAS5500 Dialogue(8.9.0) - Job Definition	PAS5500 Graphics
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Size Print
Single Mark	U2U62U1Stest
Layer Layer Nr : 0 Layer ID(s) : MARKS Wafer Side : A	3 + + 2 1
Mark ID : LEFT	
Mark Type : PM Large Edge Clearance : Y ∳	-2
Mark Exposure : N	-3 + +
Mark Position X -5 Y 0 Cell Index X -5 Y 0 Mark-to-Cell Shift [mm] X : 4.00000 Y 0.00000 Wafer Coordinates X : -46.00000 Y 0.00000 Region : Left Wafer Side : A	-4 -5 -5 -4 -3 -2 -1 0 1 2 3 4 5 Regions Exposed
Action <u>Apply</u>	
Mark <u>Prev</u> <u>Next</u> Select : <u>LEFT - PM</u>	
Report <u>View Marks Exposure</u>	
Enter Y(es) or N(o)	

Instructions for Combined Mark/Image Exposure:

Mark Exposure – for *each mark*, uncheck Mark Exposure in Layer 0, then click Apply.

Click <u>Next</u> at <u>Layer</u> to change to Layer 1.

Check the Mark Exposure box, then click Apply.

Repeat <u>all</u> steps for <u>each mark</u>.

When finished, click Exit, then Exit.

Strategy Selection

<u>v</u>	PAS5500 Dialogue(8.9.0) – Job Definition
Accept Exit	Help) Print ♥) Cmd Hdl) Mat Hdl) Stop) Misc ♥)
Strategy Selection	
Layer ID	: 2 - UR
Alignment Strategy Us	age
Active	: FOUR
Evaluation 1	: None
Evaluation 2	: None
Evaluation 3	: None
Evaluation 4	: None
Evaluation 5	: None
Close Green Laser Shu	tter : <u>N</u>
Reticle Alignment Met	hod : TTL
Action <u>Apply</u>)	
Layer Previous)	Next) Select : 2 - UR
Report View Strateg	y Selection)_

<u>Reticle Alignment Method</u> – verify it is <u>TTL</u>.

At Layer, click Next.

For each layer, select the Alignment Strategy desired from the list, then click <u>Apply</u>.

Click Exit when finished.

Process Data

<u>v</u>	PAS5500 Dialogue(8	9.0) – Job Definitio	n
Accept Exit Help) Print ♥) _Cm	d Hdl) Mat Hd	[<u>]) _Stop</u>) <u>Misc </u> ♥)
Process Data			
Layer	: 2 - UR		
Prealignment Mode Optical Prealignment Selection Mark 1 Mark 2	: Y ▲ : LEFT - PM : RIGHT - PM		J Mark 1
Alignment Mode Symmetrical Alignment	: <u>N</u>		LEFT - PM RIGHT - PM TOP - PM
Layer Shift [um] X	:0.00	Y	BOTTOM - PM
Lens Heating Correction	: _1.00		
Matching Set ID	: DEFAULT	_Select_)	
CoO Reduction	: <u>Default</u>		
Action Apply _			
Layer <u>Previous</u>) _	Next)_	Select : 2	- UR
Modify Process Correcti	ions)0v	erlay versus Tl	hroughput)
Report View Process Dat	a) _		

<u>Optical Prealignment</u> – for each layer, make certain this is selected <u>only</u> if PM Marks will be visible <u>within the</u> <u>dark gray areas</u> shown in the Alignment Definition diagram. Various available mark locations may be selected by clicking on the marks listed.

<u>Combined Mark/Image Exposure</u> (*not recommended*) – check this box to expose PM Marks on the first device layer. See <u>Single Mark</u> instructions.

At Layer, click <u>Next</u> and repeat steps for each layer.

Click Apply, then click Exit when finished.

Reticle Data

<u> </u>	PAS5500 Dialogue(8.9.0) - Job Definition
Accept Exit)	Help) Print ♥) Cad Hdl 1 Mat Hdl) Stop) Misc ♥)
Reticle Data	
Layer	: 1 - WI
Combined Mark/Image H	Exposure : Y 🖌
Image ID	: UL
Expose Image	: <u>Y</u> 🖌
Reticle ID	: CNF* Lens Reduction : <u>4x</u>
Identical Masking	: <u>Y</u>
Reticle Image [mm]	
Size	X : <u>40.0000</u> Y : <u>40.0000</u>
Shift	X : <u>-22.000000</u> Y : <u>22.000000</u>
Masking Window [mm]	
Size	X : 40.00 Y : 40.00
Shift	X : -22.00 Y : 22.00
Energy [mJ/cm2] :22.00
Focus Offset	[um] : <u>0.00</u>
Focus Tilt Offset Lui	'ad] Rx : <u>0.0</u> Ry : <u>0.0</u>
Illumination Mode	: <u>Default</u> Default Mode : Conventional
Numerical Aperture	: 0.57
Sigma Outer	: 0.750
	и.
Action _Apply _	
Image <u>Previous</u>)_	Next), Select : UL
Layer <u>Previous</u>)_	<u>Next</u>) _ Select : <u>1 - UL</u>
Report <u>View Reticle</u>	e Data) _
Press F11 to activate	e Button.

Indicate which reticle images are to be exposed in each layer.

Image – click <u>Next</u> to cycle through *all* available Images for *each* Layer.

<u>Expose Image</u> – check or uncheck this box for *each* Image on *each* selected Layer. <u>All</u> Images are *exposed* on *all* Layers *by default*.

<u>Layer</u> – click <u>Next</u> to cycle through each Layer.

<u>NOTE</u>: you <u>MUST</u> click <u>Apply</u> to save changes <u>*before*</u> cycling to the next Image or Layer.

Leveling Data

<u> </u>	PAS5500 Dialogue(8.9.0) – Job Definition
Accept Exit	Help) Print ♡) Cmd Hdl (Mat Hdl) Stop) Misc ♡)
Leveling Data	
Layer ID	: 1 - UL
Critical Percentage	[%] : <u>83</u>
Focus Edge Clearance	[mm] : <u>3.000</u>
Shifted Measurement S	cans : Y 🖌
Leveling data Level	ing Data II)Leveling Data III) _
Action <u>Apply</u>	
Layer <u>Previous</u>)_	Next) Select : <u>1 - UL</u>
Report <u>View Levelin</u>	g Data)_

Shifted Measurement Scans can improve yield at the edges of the wafer.

<u>Shifted Measurement Scans</u> – for all Layers other than Zero, click the <u>Shifted Measurement Scans</u> box, then click <u>Apply</u>.

At Layer, click <u>Next</u> for the next Layer. Click <u>Exit</u> when finished.

Utilities

Click on <u>Utilities</u>. <u>Copy</u> your file to the [scratch] directory, then <u>Delete</u> the original file in the [jobs] directory.

If you need to make a folder, use your NetID as the folder name.

PAS5500 Dialogue(8.9.0) - Job Definition		
Accept) Can	ncel) Help) Pri	$\underbrace{nt\ \overline{\nabla}}_{\operatorname{Cmd}\ Hd1} \underbrace{Mat\ Hd1}_{\operatorname{Mat}\ Hd1} \underbrace{Stop}_{\operatorname{Stop}} \underbrace{Misc\ \overline{\nabla}}_{\operatorname{Misc}\ \overline{\nabla}}$
Job Utilities		
O <mark>peration</mark> Home	: <mark>Copy</mark> : user_data/jo	bbs
Source Select)	:	Operation
Destination Select	:	List Copy Rename
Action Apply)	Delete
Device Utilit	ies) _ Ci	reate Directory)_