Heidelberg Instruments Conversion software "x-convert"

Introduction

This guide explains how to convert the CAD layout of your device into the internal format (lic files) of the VPG200 equipment, using the HIMT **«x-convert»** software.

The initial formats that are accepted are **.gds**, **.cif** and, with restrictions, **.dxf** files

This operation does not require booking and login on the VPG200 equipment.

Notes:
- We recommend to do the conversion well before the VPG200 session to have sufficient time to fix the layout in case of compatibility errors/issues.
- Layouts with a high number of polygons (such as dense arrays of small lines or holes/pillars) can take up to several hours to convert. Several instances of x-convert can run in parallel so that users can convert several layouts simultaneously.

Heidelberg Instruments Conversion software "x-convert"
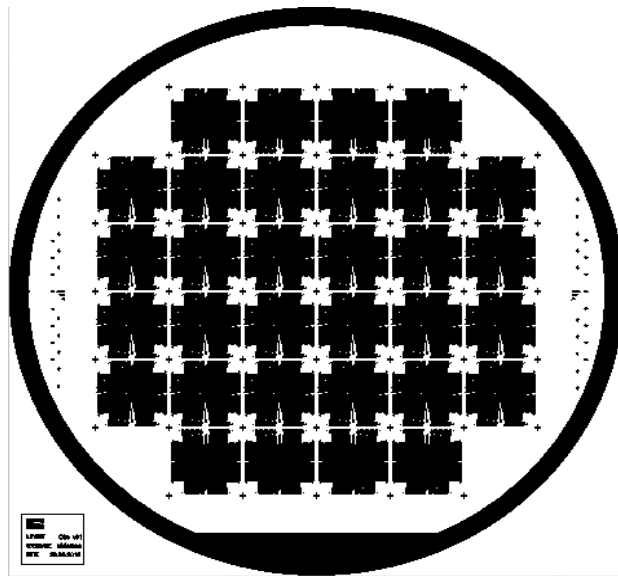
Design from the layout editor (Klayout, CleWin, …) in .gds, .cif, or .dxf format …
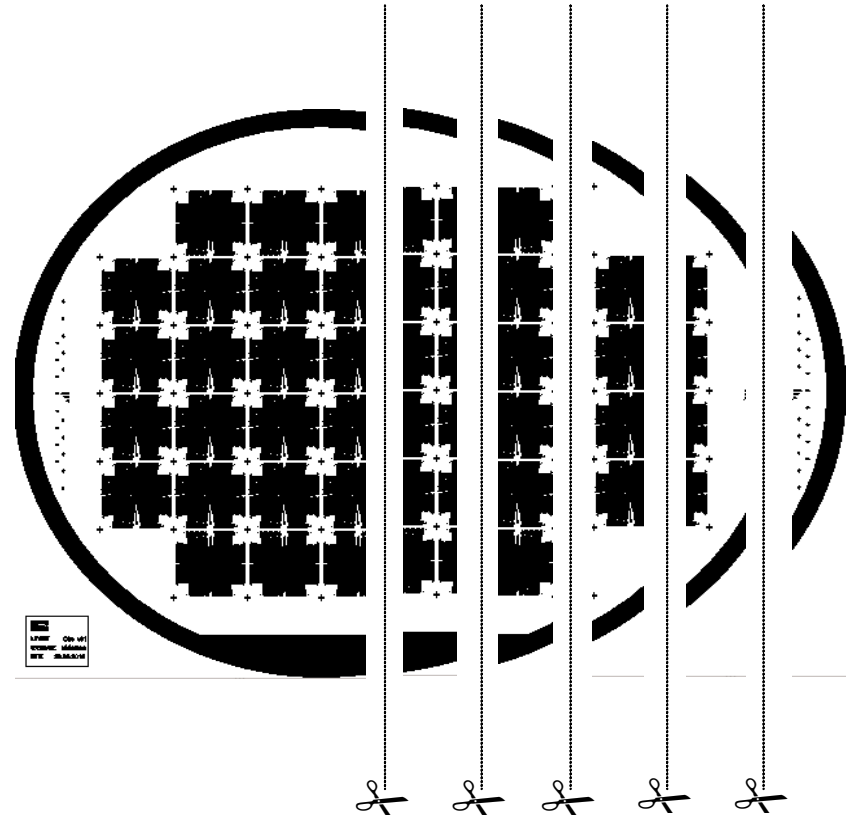
… cut in stripes in the Heidelberg internal format "lic" files

Step 1 – getting started

1. Use the \\sti1files.epfl.ch\cmi-transfert shared network folder to transfer your layout to the conversion PC.

   N.B. Zone PCs can be used to download the layout from mailboxes or online storage.

2. Transfer your layout file into the appropriate folder (based on the file format)

   Notes:
   - Do not use special characters such as:
     - . , ; : < > ? * ( ) @ !
   - File extension in lowercase only:
     gds, cif, dxf

3. Klayout is available on the conversion PC to view/edit layouts.

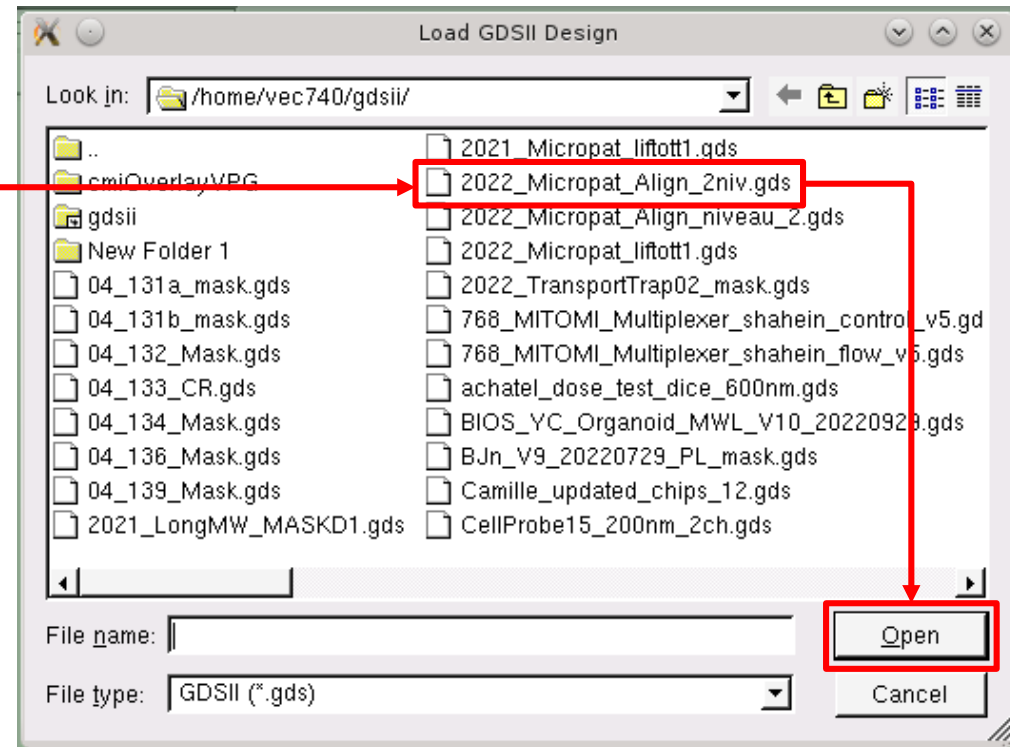4. «x-convert» is started with a double click on the desktop icon.
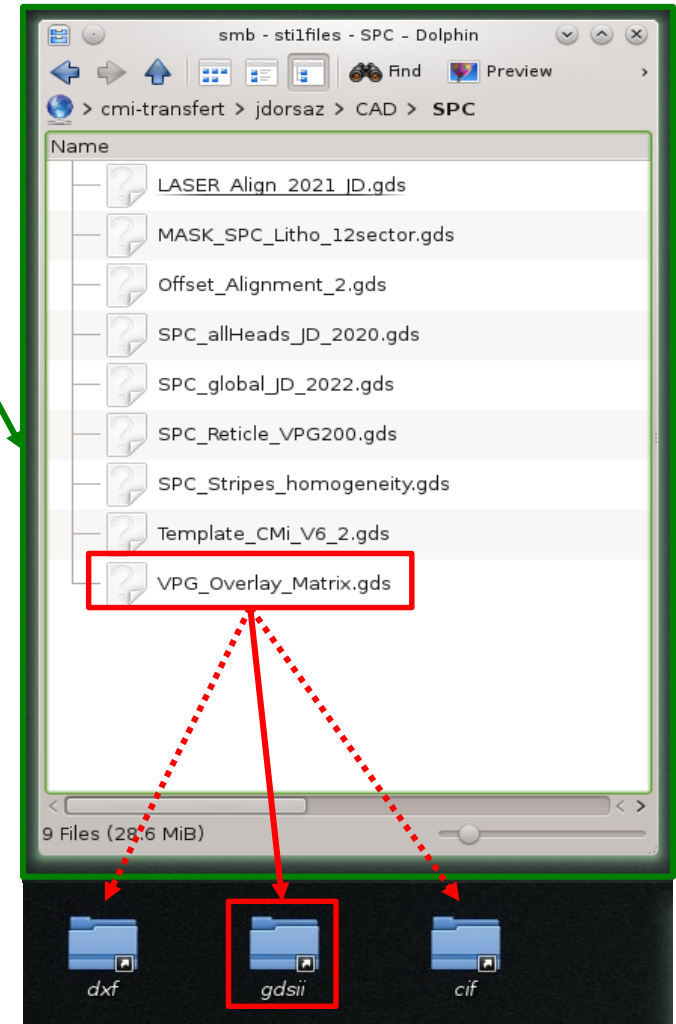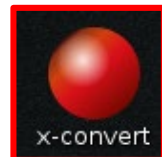
Step 2 – job creation & loading data

1. Start «x-convert»

2. Click on «New job» :

3. Change the name and click «OK»

   Notes: maximum 28 characters

4. Load your layout with «Source File» → Add →
   « data-format» (GDS, CIF,…)

5. Select your file and click «Open»
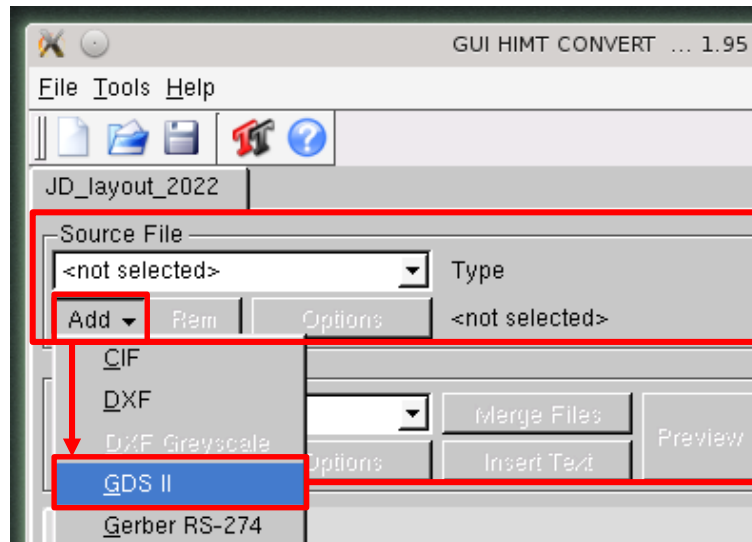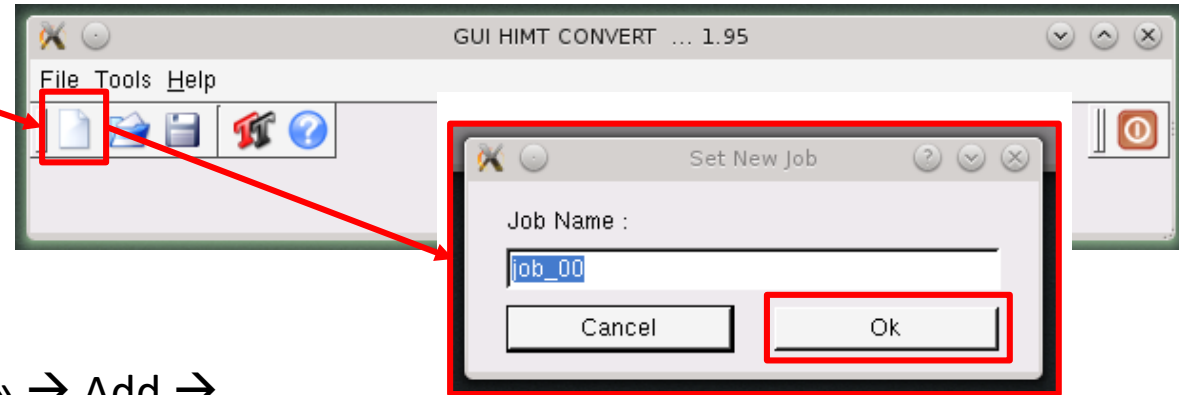
4

Step 3 – layers & topcell selection

«x-convert» will detect all layers & cells declared in the layout file. Make sure to:

1. Select the layer(s) to be exposed:
   - GDS: multiple layers can be exposed simultaneously (checkbox on)
   - CIF: only one selection possible

2. Select the «TOP_CELL»:
   (the cell that contains all the elements to be exposed)

3. Click on «Create Default»
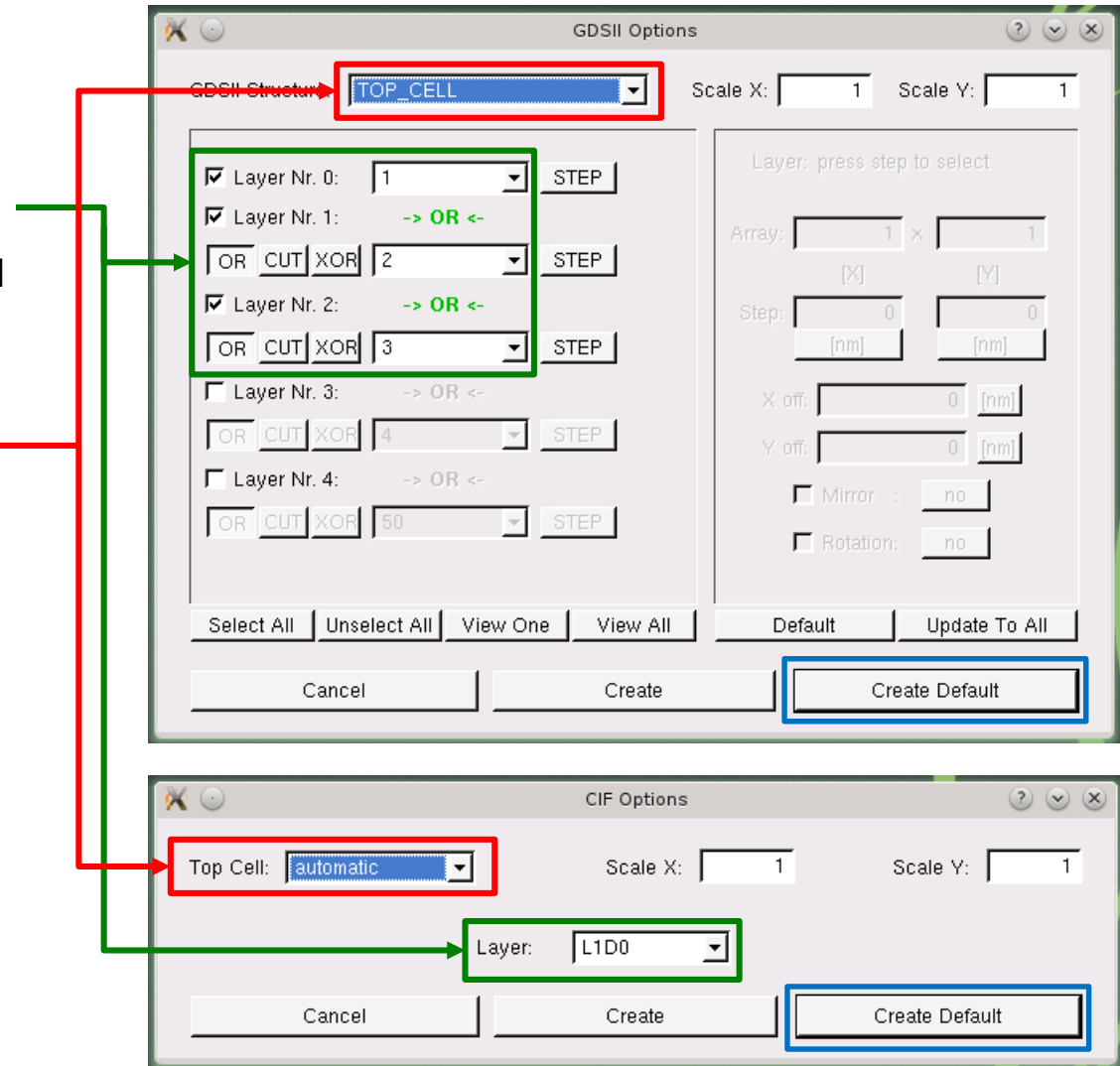
Step 4 – preview
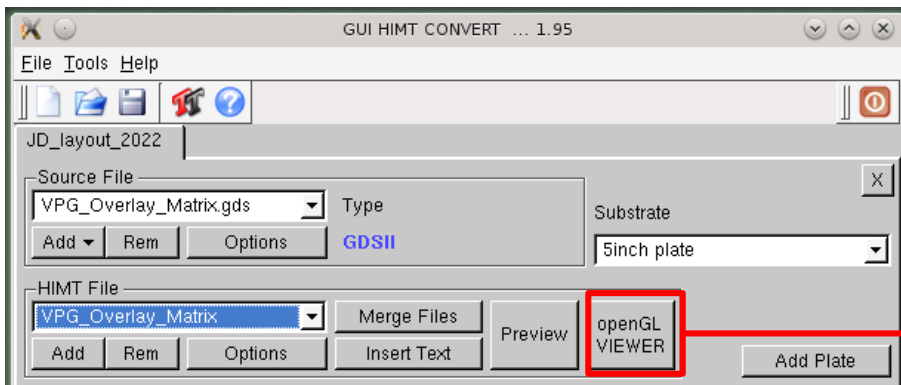
Users should confirm the selection of the correct layer(s)/cell with the «openGL VIEWER»:

- Set ''View Options'' to ''Fill''
- Check the design dimensions and the position of the (0,0) coordinate.
- Measurements can be done to find the layout critical dimension (CD) with:

N.B: «Preview» is an older version of the viewer which is not as user friendly and not recommended to use.
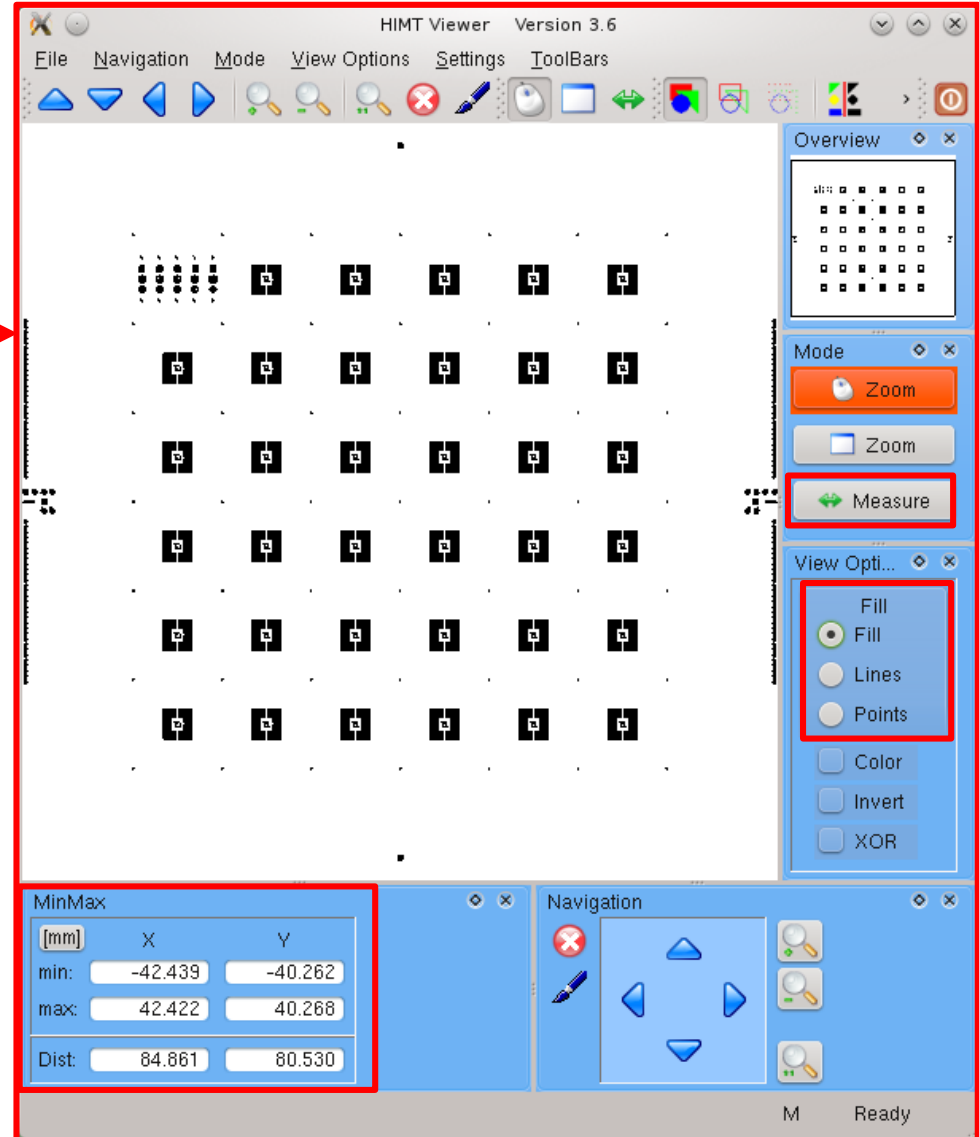
Step 5 – Writehead (WH) selection

On the VPG200, users can choose between 3 writeheads/lenses (high, mid and low NA) and 2 DMD (GLV) number of pixels/mirrors:

- Writehead: **4mm**, **10mm** or **20mm**

- GLV number of pixels = ''Stripe Width'':
  - **1000 pixels** (default) or
  - **700 pixels** (manually adjust!)

Based on the configuration, the resolution and the exposure speed will change. Users should select the configuration based on the smallest layout dimension (CD).
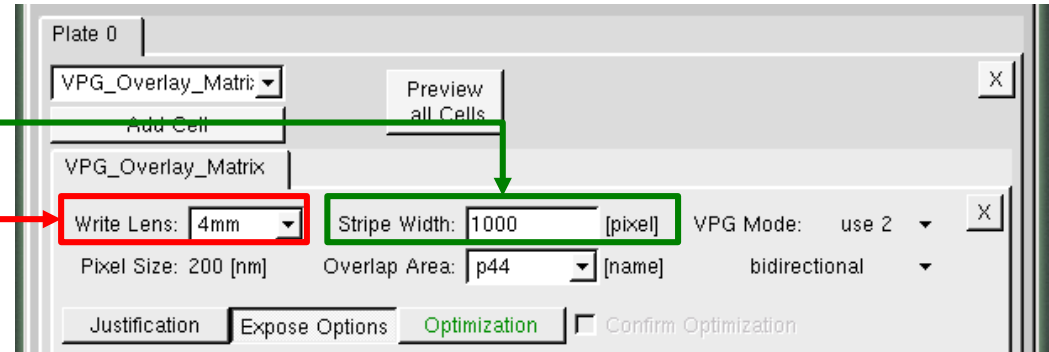
write mode	write head / write lens	Resolution [um] *	pixel size [nm]	stripe width [um]	number of stripes for 100mm width	write speed [mm2/min]	write time for 100mm x 100mm
High Speed	**20mm**	2	1000	1000	100	1960	~ 4'
Standard	**10mm**	1.2	500	500	200	980	~15'
Advanced	**4mm**	0.75	200	200	500	190	~55'
Advanced+	**4mm, 700px**	0.65	200	140	715	< 140	~70'

* minimum achievable dimensions depend on the layout and the resist choice (type & thickness)

Step 6 – Layout geometry

Select the ''Justification'' tab.

Users should:

1. <u>Check the exposure window dimensions</u>. It should fit within your substrate (wafer or mask) dimensions.

2. <u>Check the exposure window position.</u> For first exposure jobs (without alignment), the layout (0,0) coordinate will be placed at the center of the substrate.

   If the layout coordinates are wrong, users can activate : ☑ Automatic Centering to offset the layout, <u>only for first exposure jobs.</u>

3. <u>For Cr blanks</u>, activate ☑ Mirror [at y] (imaged is mirrored since masks are exposed CR UP but used CR DOWN in exposure equipment)

Step 7 – Layout inversion

Select the ''Expose Options'' tab.

Expose Options

Users should:

1. Select the exposure polarity:

    o **clear** = hatched/black area exposed

       → **masks are <u>transparent</u> inside polygons**

    o **dark** = blank/white area exposed

       → **masks are <u>chromium</u> inside polygons**

    N.B. When exposing wafers, do not forget to take into account the polarity of the PR (positive or negative)

2. With **dark** mode, the exposure stops at the layout limits (bounding box). Users can extend the exposure, up to the substrate limit, by using the «Add Frame» option.
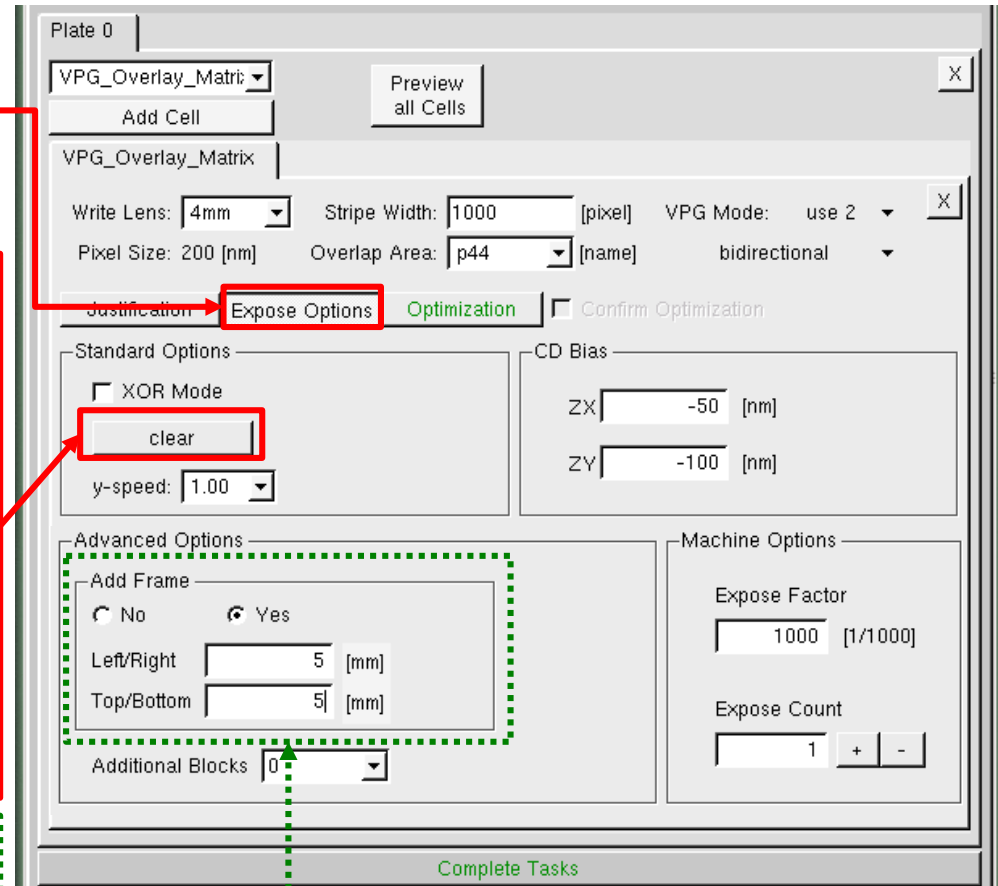
Step 8 – conversion

When all options are correctly set, users will start the conversion process with:

1. Click on «Complete Tasks»:

2. Confirm the job name and save. Do not change the path !

3. Click on «Complete Expose Jobs».

4. Wait for completion before closing all windows.
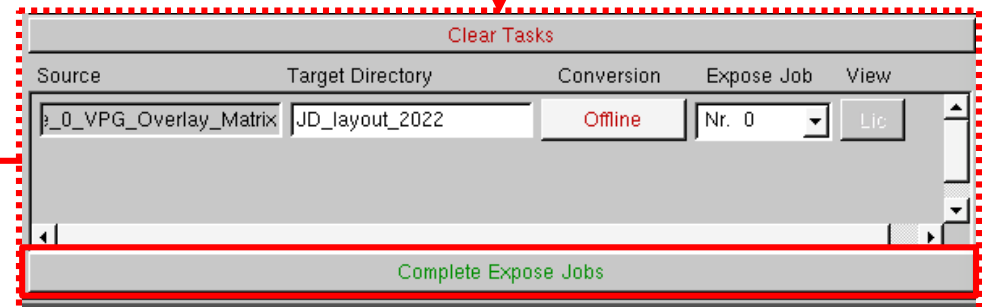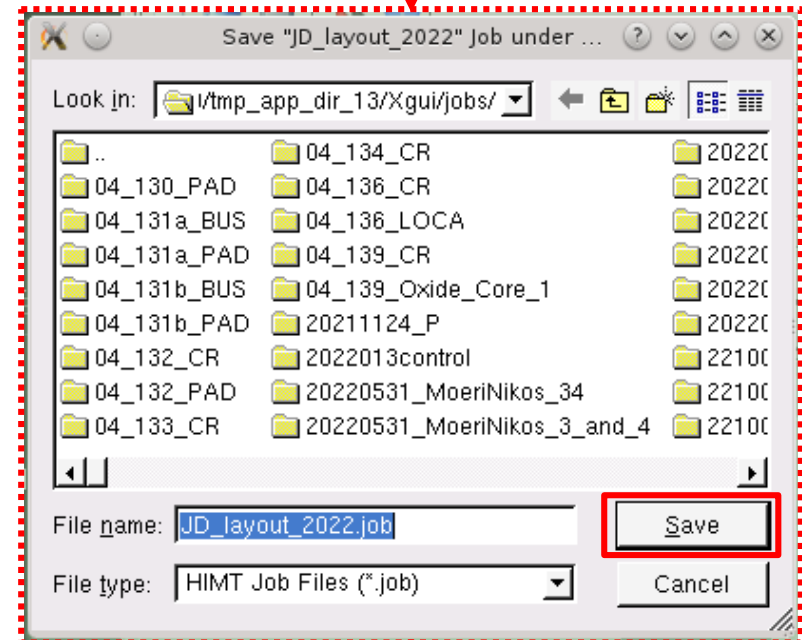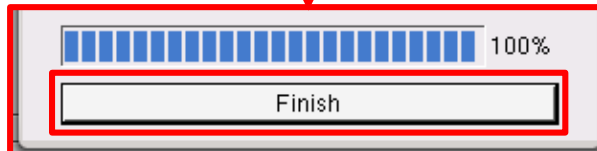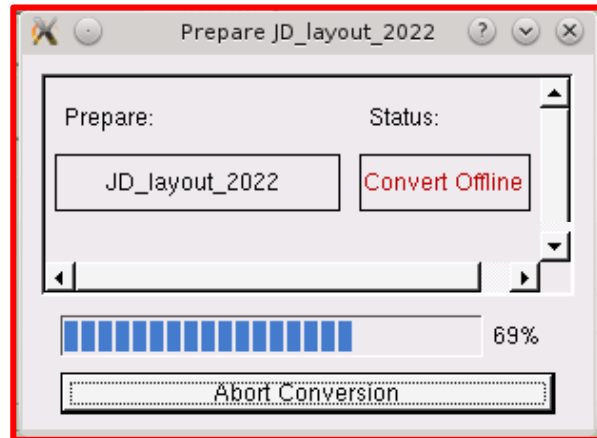
Step 9 – job managment

Loading jobs :

Exposure jobs can be loaded for verification of the parameters, reconversion, … with the menu «File» → «Load job»:
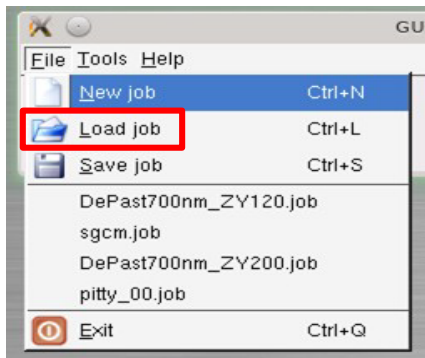
Look for and open the «name.job» file.

Cleaning jobs :

If you need to remove your design and conversion data from the conversion pc, then follow these steps:
1. «Tools » → «Job Dir Manager»
2. Activate the checkboxes to delete the convert & exposure jobs, LIC directory and source file.