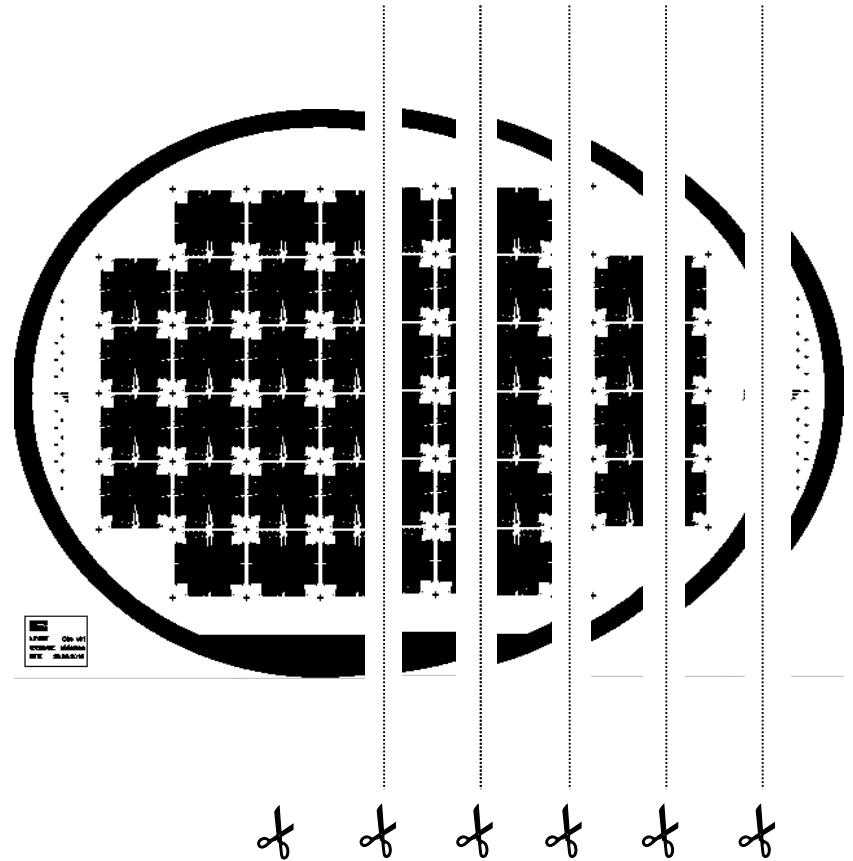
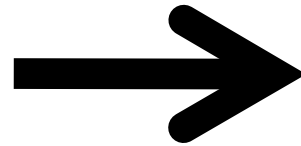
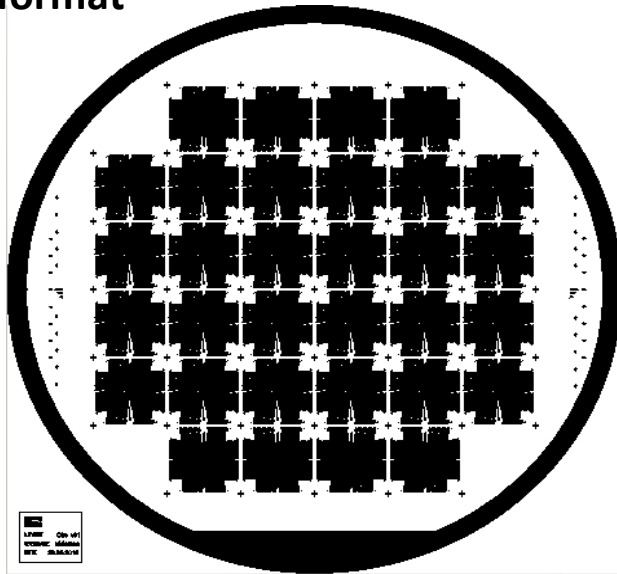


Heidelberg Instruments Conversion software "x-convert"

Design in layout editor
format



cut in stripes
Heidelberg internal format "lic"

Manual of x-convert Conversion GUI

1. [Copy your layout data file](#)
2. [Start Graphical interface](#)
3. [Configure your exposure job](#)

Figure 1: [Mask Mirroring](#)

Figure 2: [Data polarity for mask and direct writing](#)

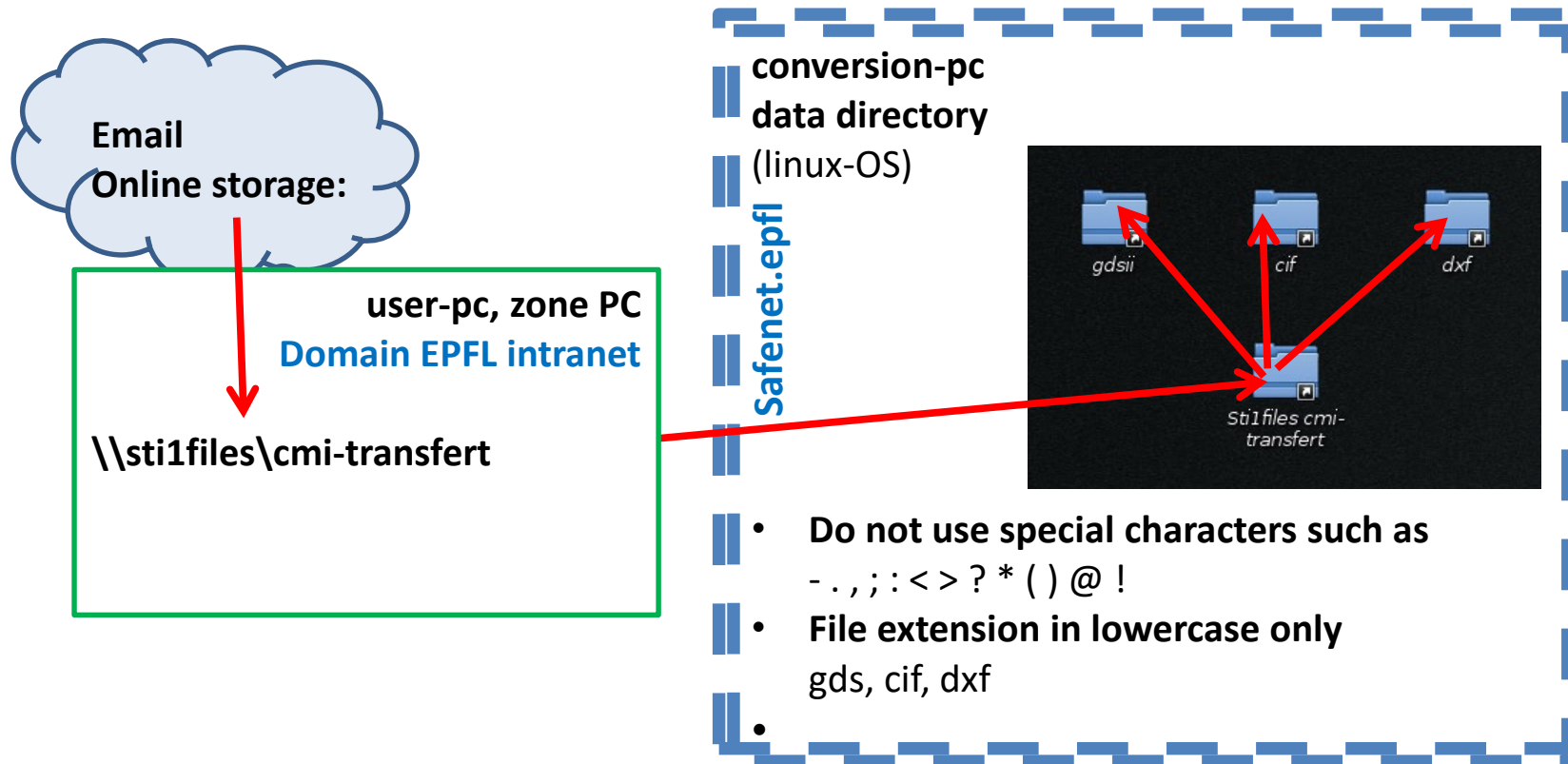
Quick [Overview Summary](#)

This GUI is running on a Linux OS workstation free of access. Do not book VPG200 or logon for use.

GUI help user to prepare a script for immediate computing bitmap information for use as a real-time high rate flux for the VPG200 laser writer. Common layout are computing in 1 to 10 min. Exceptional layout with 'decoration' periodic structures or computed generated diffraction elements may take several hours.

More than one GUI interface can run under Linus OS operating as a multi-task system

Copy your design data



Do **not** make **softlinks** to design data residing outside of the gdsii/cif/etc. directories.

(the software cannot handle it)

Do **not** create **subdirectories** within the gdsii/cif/etc. directories

- Link to the cmi-transfert server is found on the desktop.
- Drag it to one of the folders "gdsii" / "cif" / "dxf" that sit on the desktop.
- *move or copy here* to start transferring data.

Start conversion software

Use left working station Activate with mouse (NO password required)



Start conversion application

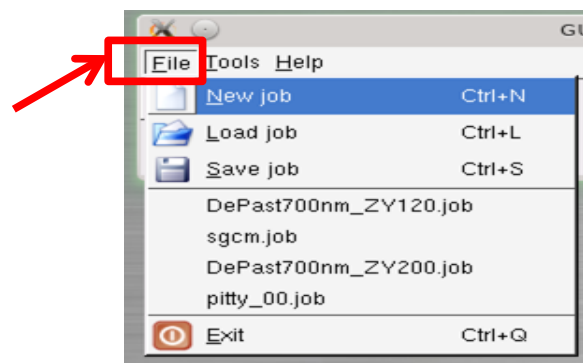
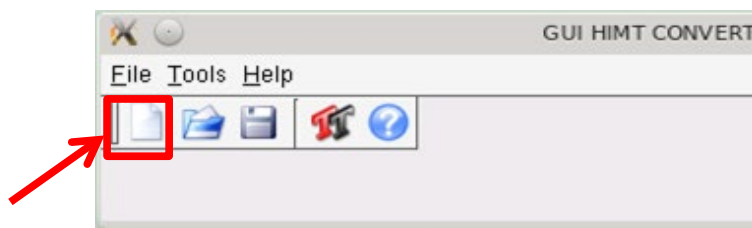
or



Use a terminal window; type **"app"** on the command line

```
|vec740@cmipc113:~> app
```

Conversion user interface pops up, click on white page or "File"



Start with a new job. Rename with your name

"<your 3 initials><jobname>

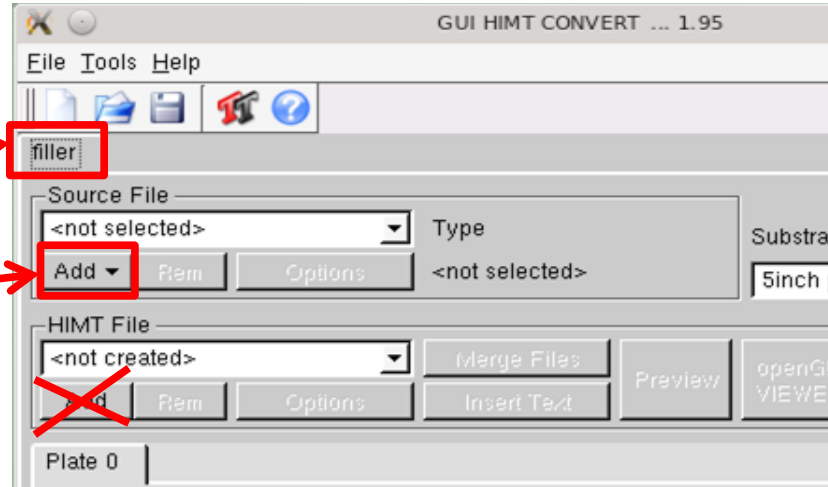
e.g. John Doe -> jdo_crocodile_v2_lay28

(max 28 characters)

Step 1 – retrieve design

Conversion user interface is updated with **frame** containing your job name.

"<your 3 initials><jobname>"



Continue specifying the design data:

Source File: Add

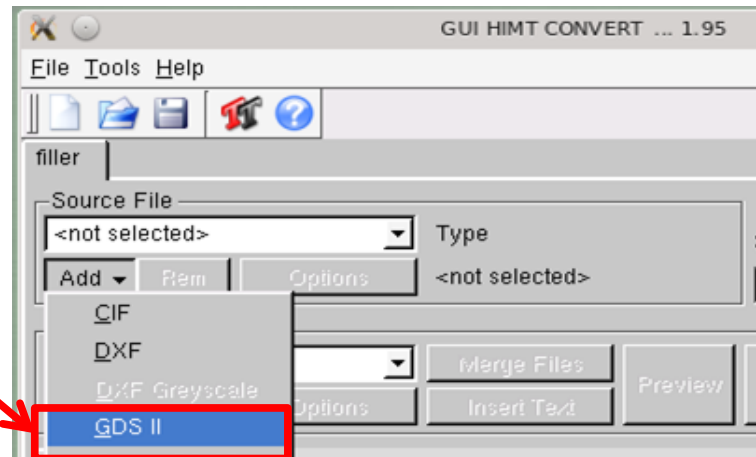
(Do not use add in HIMT section)

Opens a popup

“Load GDSII Design” or

“Load CIF Design” etc...

Dialog to retrieve your file in the corresponding folder opens. Select and confirm with “open”



Next window open with a specific data type filter

Step 2 – "gds" filter: Top cell & Layers

GDSII filter window opens:

GDSII Structure: Select design's structure
(Main symbol, top cell or renamed top view)

~~Unselect all~~
(or view one)

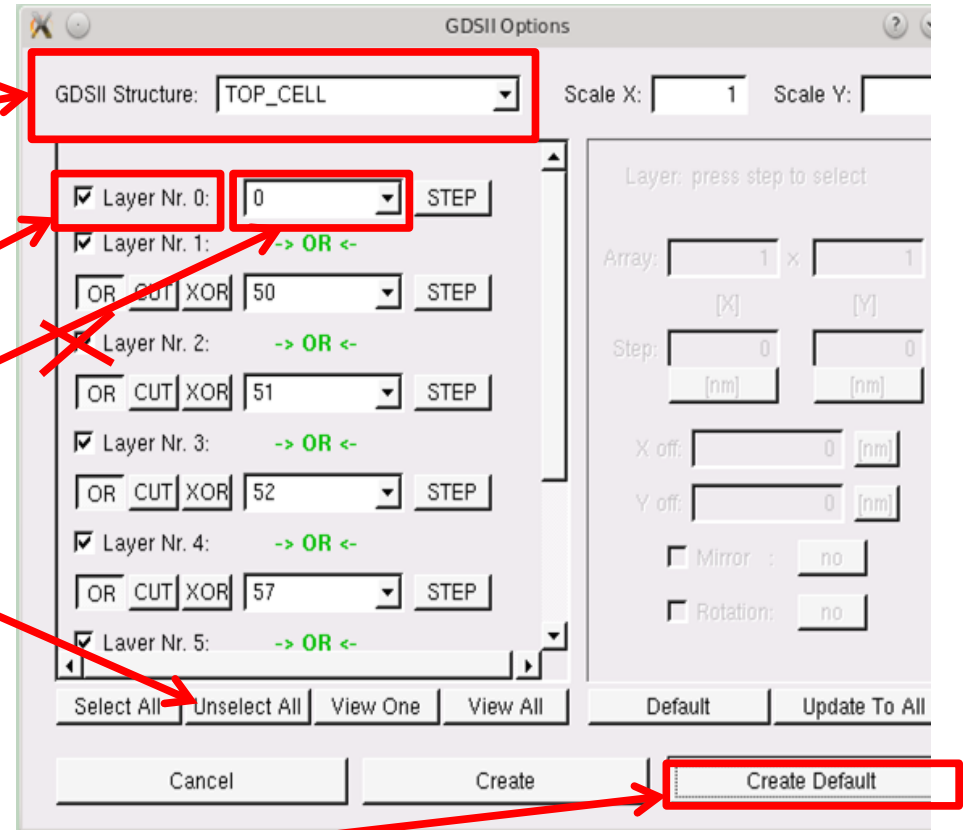
Select Layer Nr 0: (tick box)

Point on your GDS layer number

Optional repeat for next Layer Nr.2 and
select bitmap boolean operation

In example "Layer Nr.1" reads data from
GDSII-file "50" and add it to GDSII-file
"0"

When done, click **"Create Default"**

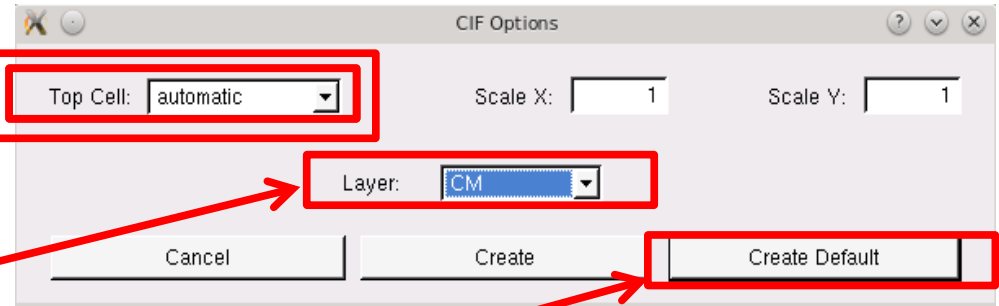


Step 2 – "cif" filter: Top cell & Single layer

CIF Options pop up window opens:

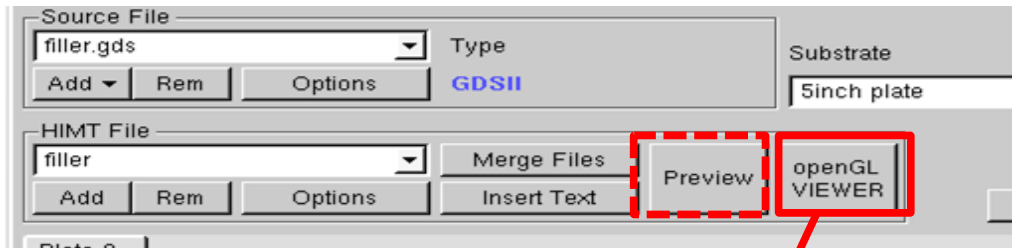
Top Cell: Select design's structure
(Try automatic to select "fabrication cell")



Layer: Select correct layer among listed of
CIF-LayerNames found.



When done, click **"Create Default"**

Step 3 – View selected data



Open a Viewer to review your selection: 
Old school: “Tk/Tcl Preview” 
New style preview is preferred (easier to find commands)

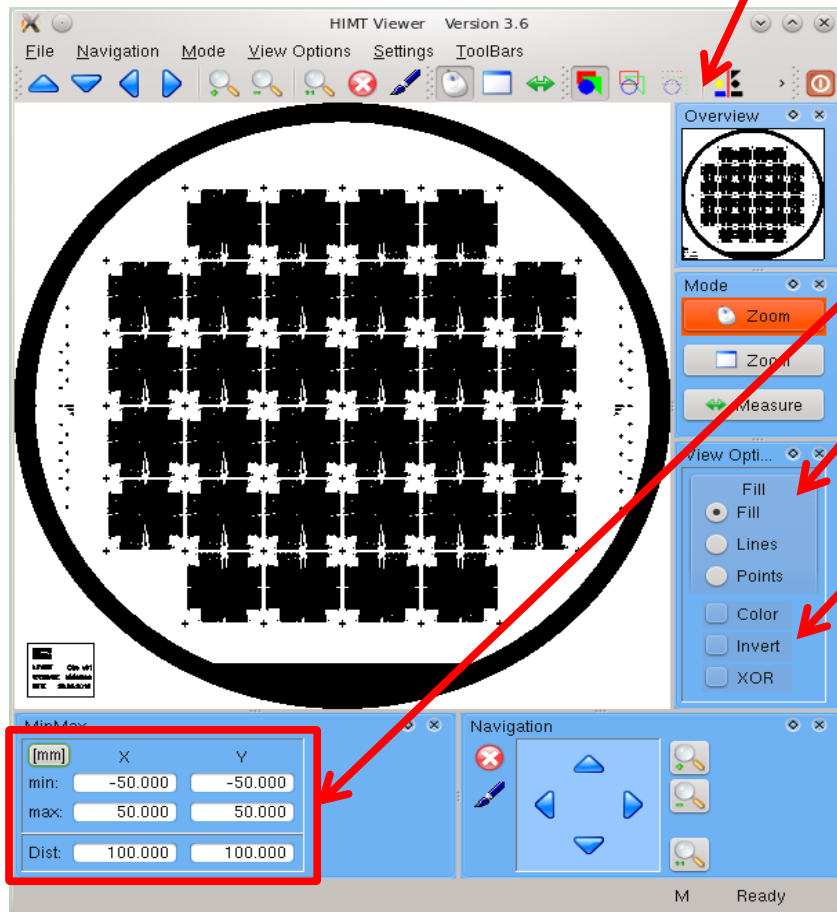
Check for mask size and center

Select “Fill” mode to view inside polygons in black (exposed area)

Simulate inverted mode. If selected must be set **“dark mode”** at step 5

Two zoom mode available:
Mouse click (2x) or Window (define box area)
“Measure” activate a tool for measurement

Close preview and return to convert interface window



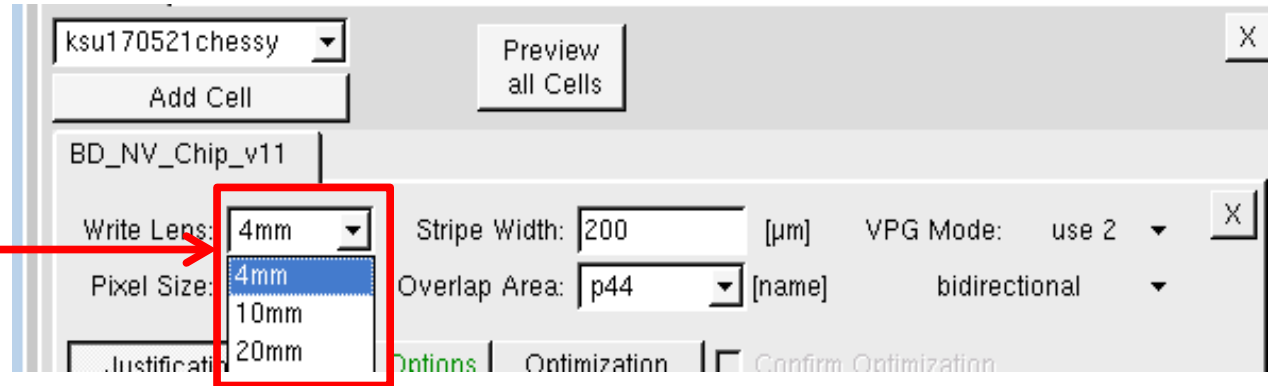
Step 4 – Write Head Selection

Select write lense:

Spot size / Resolution are hardware dependent

3 lenses are available with following specifications

Lenses are labeled by focal length [mm]

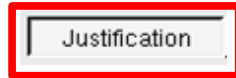


write mode	write head / write lense	Beam diameter* [um]	pixel size [nm]	stripe width [um]	number of stripes for width 100mm	write speed [mm ² /min]	write time for 110mm x 110mm
High Speed	20mm	0.8	1000	1000	100	1960	6' 10"
Standard	10mm	0.9	500	500	200	980	12' 30"
Advanced Advanced+	4mm	0.65 < 0.5	200 200	200 140	500 715	190 < 140	65' > 125'

* Minimum structure width in X/Y axis direction simultaneously. Vertical lines are smoother than horizontal.
Advanced+ mode is available for 600nm critical dimensions subject to certain layout restrictions

Step 5 – Check Option: 1-Geometry

Select Justification tab



Expose Window

Must fit with your design.

When size is smaller as expected double check for **design's structure** at step 2

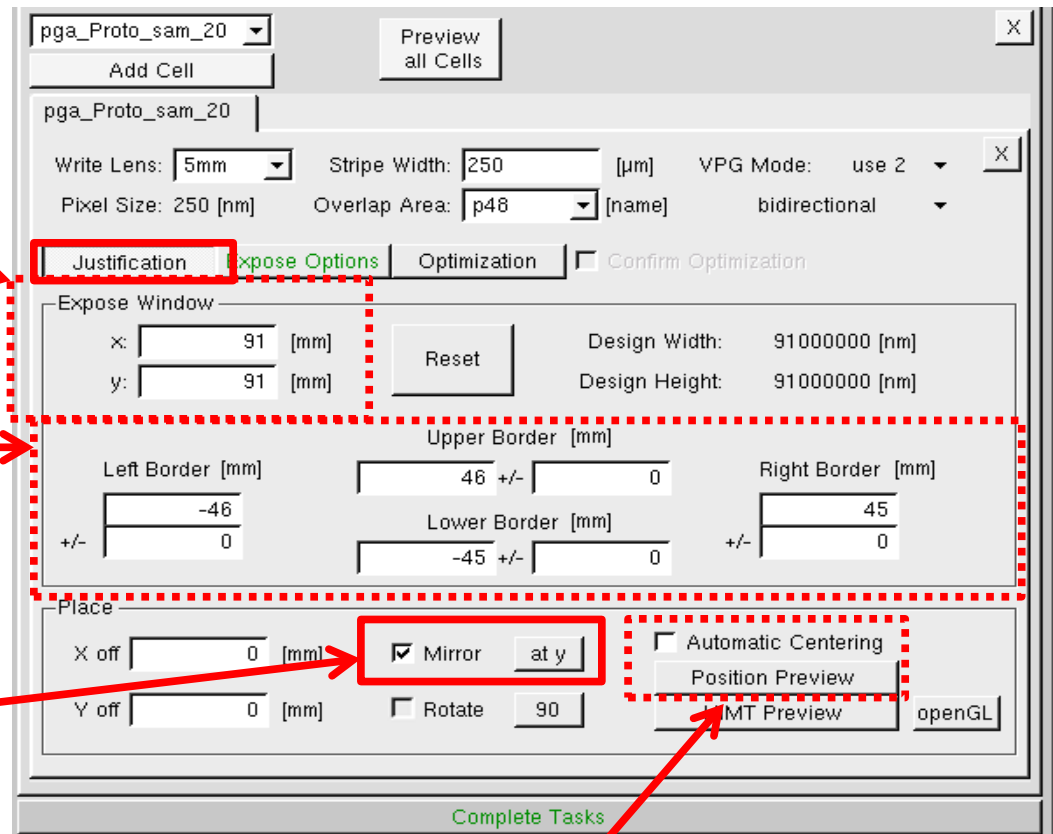
Borders

Shows Upper/Lower/Right/Left limit of exposure. In case of inverted design oversize the limit to the full wafer or use “add frame” in next options (step 6)

Mirror at Y

[Activate mirroring](#) for all **top side** masks.

Do not activate for **backside** masks or **direct** writing



Automatic Centering:

WARNING: Automatic centering may dis-align next layer masks. Maybe use only for single layer project. Check with **Position Preview** how looks your design position relative to the Cr-plate

Step 6 – Check Option: 2 - Exposure Polarity

Select Expose options tab: **Expose Options**

Mask polarity

clear = non-inverted

insides of layout polygons are written

dark = inverted

outsides of layout polygons are written

CD Bias

Default beam symmetry correction is loaded here

Add Frame

Active only with “dark”

Add a clear frame oversizing exposure window. Borders in step 5 do the same job

pga_Proto_sam_20

Add Cell

Preview all Cells

pga_Proto_sam_20

Write Lens: 5mm Stripe Width: 250 [μm] VPG Mode: use 2

Pixel Size: 250 [nm] Overlap Area: p48 [name] bidirectional

Justification **Expose Options** Optimization Confirm Optimization

Standard Options

XOR Mode

dark

y-speed: 1.00

CD Bias

ZX -110 [nm]

ZY -30 [nm]

Advanced Options

Add Frame

No Yes

Left/Right 0 [mm]

Top/Bottom 0 [mm]

Additional Blocks 0

Machine Options

Expose Factor 1000 [1/1000]

Expose Count 1 + -

Complete Tasks

Step 7 – launch for computing

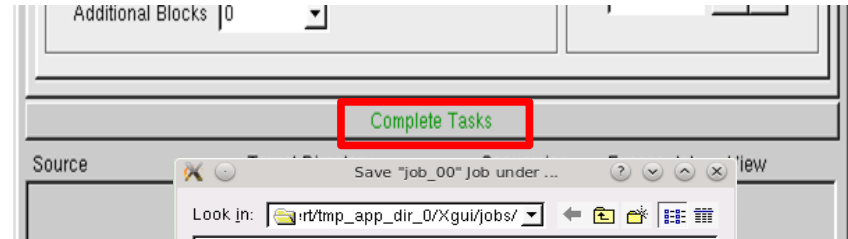
Skip “optimization”



Activate “Complete task”

Complete Tasks

Design name can be changed before saving.
Do not create sub-directory



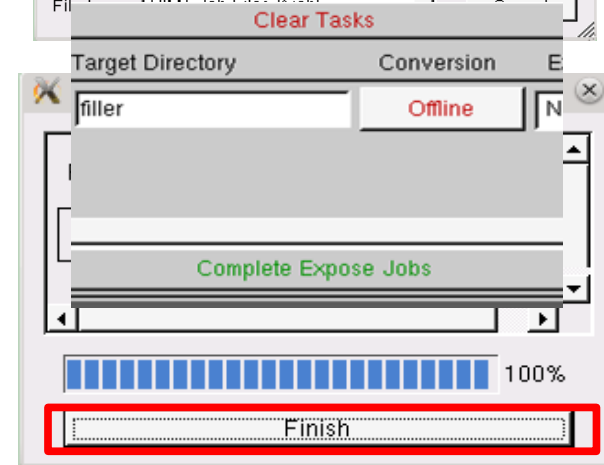
Conversion are **Offline** for VPG200
(No need to logon or book the tool to perform conversion with the present manual. Linux operating system support multi task conversion. You can access the conversion PC at any time include overnight)



Wait for completion of conversion.
Conversion progress bar is activated.
Acknowledge end of conversion with



Will close this window

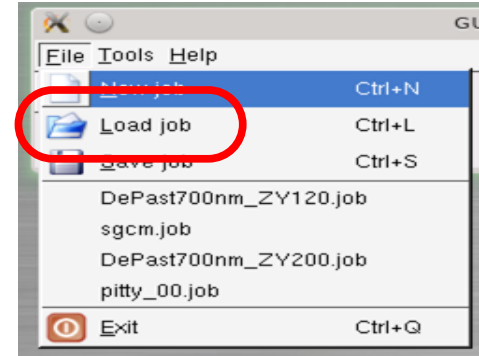


! Your conversion data are archived after 30 days !

Step 8 – Job Management: Cleanup and Refresh

Refresh your old conversion

Auto archiving or major tool parameter update may purge only bitmap data. Source files and related conversion parameters are always available for easy refreshment with File



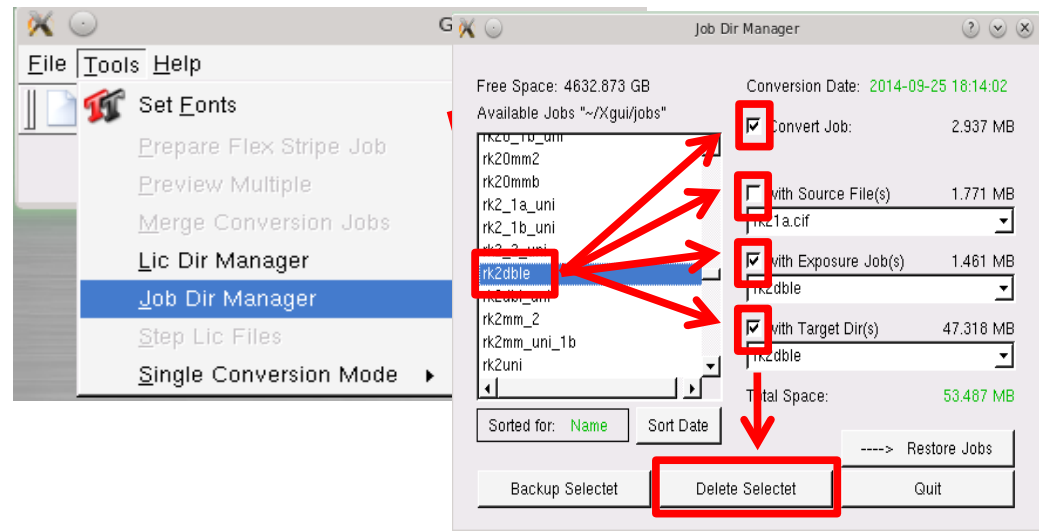
Select your job_name file (extension .job) on the top directory to retrieve the status of 'Step 7' ready to launch for computing.

Cleanup for confidentiality

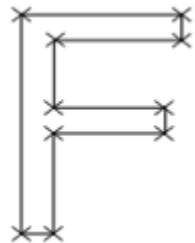
If you need to remove your design and conversion data from the conversion pc, then follow these steps:

Tools->JobDirManager

Select delete job, expo, dir, and source file.



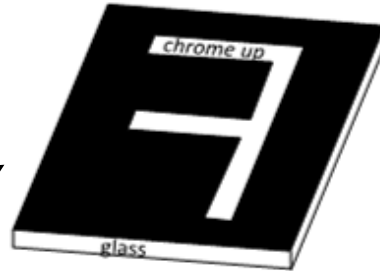
Layout Mirroring



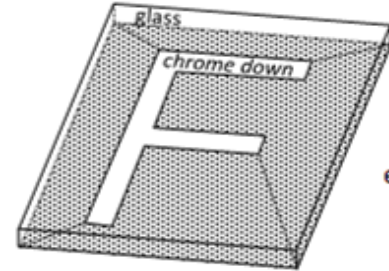
typical for
TSA mask



mirror



mirror-y (reverse)
WRCU wrong reading with chrome up

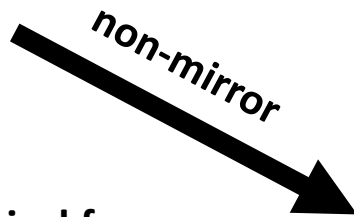


mirror-y (reverse)
RRCd right reading with chrome down

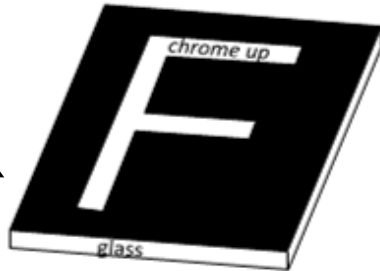
equi

flip->

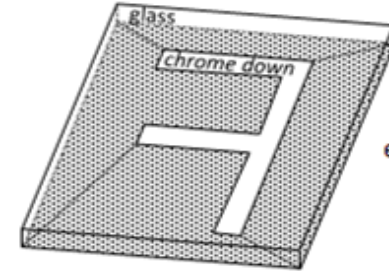
typical for
BSA mask and
direct write laser



non-mirror



non-mirror (normal)
RRCU right reading with chrome up



non-mirror (normal)
WRCD wrong reading with chrome down

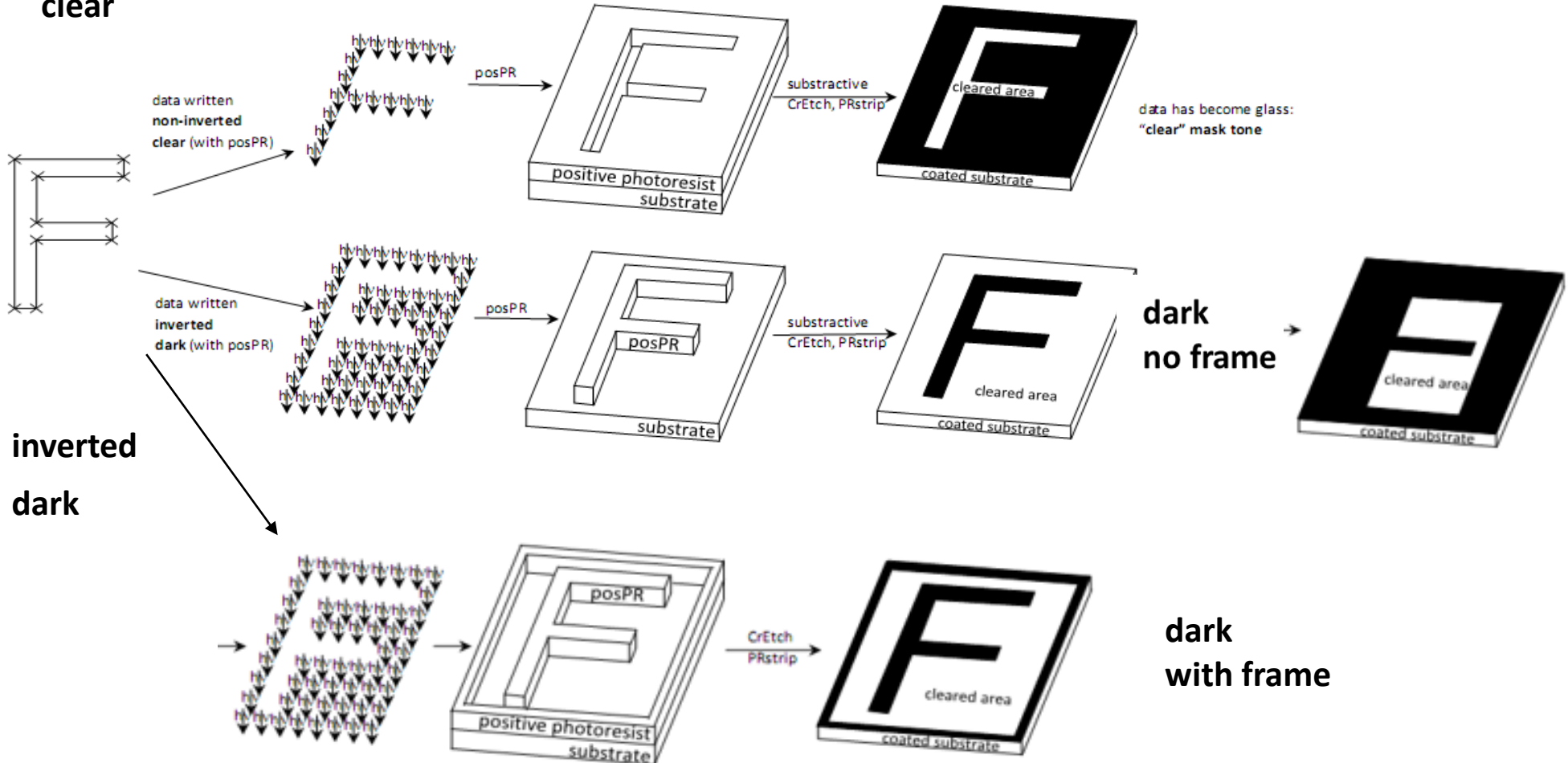
equi

flip->

Photomask process – mask polarity / mask tone

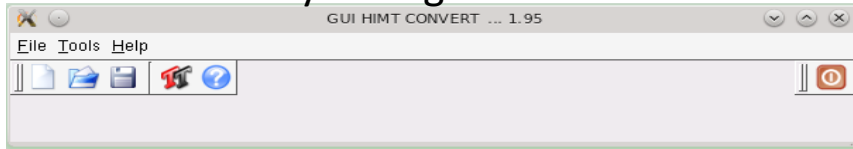
Reverse pixel polarity (Data Dark) is valid only in exposure window leading to unexpected result (second line below). Extension of exposure window or adding a frame fix the problem

**non-inverted
clear**



Quick Overview

Window when you begin:



Click-path through progressively disclosed window:

