



Micronova Nanofabrication Centre

PESO MANUAL

Version 2.4 – 28.1.2014

THINGS TO REMEMBER

- Always record your tool use – immediately!
- First entry before you start using the tool.
- Check the PESO label on the tool.
- Use “Comments” field freely to write anything interesting to you or others. PESO is the equipment diary!
- Use correct project: generally your own project.
- If you use a tool for another person: use her project.
- All tool maintenance on project **Maintenance Nanofab Aalto**.
- All training on project **Training and Process Support**.
- Main Users: if “Training and Process Support” does not require actual use of equipment, use imaginary tool “Process Support” in PESO.
- You are allowed to use only tools with the status “OK” or “PROBLEMS”. For any other status – do not use the tool!

WHAT IS PESO?

PESO is the computerised database for processing and equipment use. VTT and Aalto have separate databases, but both use basically the same software (developed and maintained by VTT).

PESO is used by all who use, repair or maintain equipment.

The equipment included in the database are identified with a PESO label. Some tools outside the cleanroom are also included! If in doubt, check from the Equipment list in PESO.

PESO is used for

- Logging equipment use (this is a Key Performance Indicator for Nanofab).
- Keeping track of problems & equipment failures, and up/downtime data
- Collecting maintenance data
- A processing diary
- Collecting data for invoicing. Note: invoicing is based on projects – be careful to use the correct project!

Access

- Users can access PESO from Aalto workstations by logging in with their Aalto username and password. In the cleanroom access is also possible with a common username/password indicated on each PESO laptop.

BOOKING TOOLS - LIMS

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- Tools are reserved for use (booked) through another web-based tool: Micronova LIMS.
- You can access LIMS from any computer with an internet connection at labbooking.micronova.fi

With LIMS you can:

- Request equipment training from Main Users.
- Book tool time.
- Send messages to other tool users. For instance: if you finished early, or are unable to use your booking, use this feature to notify other users of the tool.

Tool time is valuable. Please, do not overbook!

PESO LABELS AND USE

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- Every tool that is in PESO has a **green label** indicating this.
- All processing equipment, wet benches and main characterisation tools are in PESO. Only simple equipment like microscopes are excluded.
- You must record your use, possible problems and equipment failures.
- In some wet benches you have to record also new chemical solutions.
- **USE OF PESO IS NOT AN OPTION – IT IS A MUST!**

122 WET BENCH DEVELOPEMENT
MARK new SOLUTIONS

PESO:NEW SOLUTIONS, USE & FAILURE

114 WET BENCH SPINNER

PESO: USE & FAILURE

STANGL		Ring	
Semiconductor Equipment AG		D 73479	
400	V	Model	WPS
20	A	Baujahr	03/02
50	Hz	Auftrag	91204
WPB Resist Coating			

- In order to use Nanofab's equipment you must have a **project**.
- Projects are used for invoicing your equipment use.
- Invoices are sent to the Project Manager = Principal Scientist (this is usually your boss, professor or research group manager).
- We need your confirmation that you have a project(s), and realize that **the correct project has to be entered in the PESO diary every time**.
- You also must let us know which project is used for invoicing your use of VTT's equipment.

Using projects – Aalto's equipment:

- Always enter correct project in PESO!
- You can use more than one project (if your supervisor agrees).
- Don't use other groups' projects – unless they give permission!

Using projects – VTT's equipment:

- Use the joint project "Aalto 2013" in VTT's database ("VTT PESO").
- We'll invoice your supervisor on the basis of the project information.

PROJECT - BEFORE YOU START

Make sure that your name and your project(s) are in PESO!

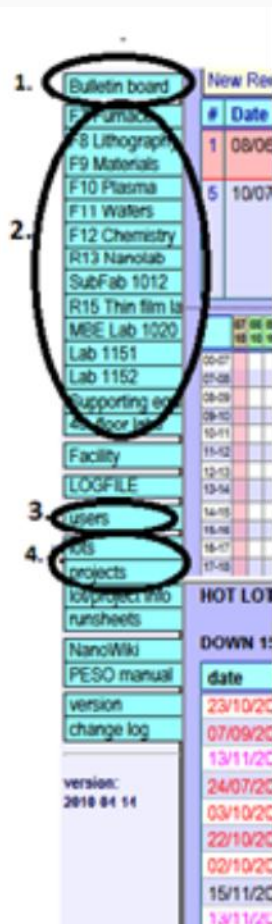
- Users are entered into the database by the Cleanroom Engineer. This is done when you get permission to use the cleanroom.
- **Projects are entered by the Nanofab personnel (Cleanroom Engineer Paula Kettula or Assistant Controller Mari Kaleva).** (Do not add projects yourself –we need to have the correct invoicing address for each project.)
- Every research group must have at least 1 project. Following data are required:
 - 1) Name of the project
 - 2) Group
 - 3) Name of the **principal scientist** (Note: this is the project manager – the person who receives the invoices!)
 - 4) Start date
 - 5) End date

USING PESO

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1. Open PESO with a browser. PESO is the default page on the cleanroom PESO computers.
2. First check the information on the bulletin board.

Useful pages and menus are listed on the left:



1. Returns the bulletin board whenever clicked
2. Menus for choosing the cleanroom bay or laboratory and finding the tools
3. User list
4. Lot and Project lists

Note: some features are only available for administrators.

START FROM THE BULLETIN BOARD

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- Bulletin Board shows relevant recent information – check it out!

1. Bulletin board

#	Date	Time	Expires	User	Comment
1	08/06/2011	15:45	30/12/2011	Veli-Matti Airaksinen	NEVER CHANGE THE NAME OF A PROJECT!!!! If you do, we'll lose all old data on that Project. If you want to make changes, create a new project instead.
5	10/07/2012	15:49	30/11/2012	Paula Heikkilä	Cr is allowed in the developer and resist stripping tanks from 10.7.2012 on. Reason: Some laser writer users have already developed and stripped their Cr masks in these tanks so the tanks are already contaminated. All other metals belongs to F12 even when you have different vessel for your developer. All contamination in the lithography moves easily into F7.

2. [Navigation menu items: F7 Furnace, F8 Lithography, F9 Materials, F10 Plasma, F11 Wafers, F12 Chemistry, R13 Nanolab, SubFab 1012, R15 Thin film lab, MBE Lab 1020, Lab 1151, Lab 1152, Supporting equipment, Floor lab, Facility, LOGFILE]

3. users

4. projects

HOT LOTS: **cu electroplating on solar cells (EPG Pre-PASS)**

DOWN 15/11/2012 11:36

date	time	days	Equipment	Status	Notes
23/10/2012	15:43	22d20h	102-2 LPCVD SIN	OUT OF USE	Furnace shut down.
07/09/2012	14:44	68d21h	106 Rinser_Dryer	DOWN	no comments...
13/11/2012	16:15	1d20h	111 Mask aligner - Elvis	OUT OF USE	no comments...
24/07/2012	15:08	113d21h	116 Single wafer dryer	DOWN	no comments...
03/10/2012	08:48	43d03h	120 Rinser_Dryer	PROBLEMS	ONLY 100mm RINCE/DRYER OPERATIONAL! IF YOU NEED
22/10/2012	14:00	23d22h	227 Furnace PEO	PROBLEMS	Furnace can be used. See diary for more details...
02/10/2012	16:18	43d20h	228 RTP	DOWN	...
15/11/2012	10:35	0d02h	253 Spinner	DOWN	no comments...
13/11/2012	11:58	2d00h	257 Scanning electron microscope	DOWN	Z-axis coordinate gets randomly messed up, be car...
16/10/2012	16:41	29d19h	260 Dual focused beam system	PROBLEMS	USE OF GASES IS TEMPORARY PROHIBITED! (Pt deposit...

Information from Aalto Nanofab personnel

Information of current equipment failures

OPEN TOOL DIARY

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REMEMBER: Filling the diary is obligatory for every tool that has the PESO label! Always.

Having checked the Bulletin Board move onto the equipment diary:

1. Choose the button for the correct cleanroom bay or laboratory - the menu below opens.
2. Choose the tool and click diary.
3. The tool diary opens.
4. Press *New Record*.

Directory: monitor/equipment/F8

Tool Name	diary	measurements	status	OUT OF USE
111 Mask aligner - Elvis	diary	measurements	status	OUT OF USE
112 Mask aligner - LOMO	diary	measurements	status	OK
113 Mask aligner - Suss MA-6	diary	measurements	status	OK
114 Wet bench - Spinner	diary	measurements	status	OK
115 Wet bench - Hot plates	diary	measurements	status	OK
115s Spinner	diary	measurements	status	OK
116 Single water dryer	diary	measurements	status	DOWN
117 Oven 120	diary	measurements	status	OK
118 Oven 90	diary	measurements	status	OK
119 Oven Adjustable	diary	measurements	status	OK
120 Rinsler_Dryer	diary	measurements	status	PROBLEMS
121 Wet bench - Resist stripping (ACE1, ACE2, IPA)	diary	measurements	status	OK
122-1 Wet bench - Developer	diary	measurements	status	OK
122-2 Wet bench Oxide etch (BHF)	diary	measurements	status	OK
122-3 Wet bench - Piranha	diary	measurements	status	OK
124 Nanoimprint lithography	diary	measurements	status	OK
126 Hot plate - Matti	diary	measurements	status	OK
127 Hot plate - Mervi	diary	measurements	status	OK
128 HMDS PRIME OVEN	diary	measurements	status	OK
130 Laserwriter	diary	measurements	status	OK

112 Mask aligner - LOMO diary

New Record | diary | Meas | Status | Config | Admin | Header | HELP

#	Date	Time	User	Project
1	19/10/2012	16:01	Paula Heikkilä	Nanofab Aalto Nanofab maintenance
0	05/11/2010	13:06	Ville Jokinen	Microfabrication NOZZLE

WAFERS = 0 after start | HOURS = 0 after start

USING THE DIARY

File :monitor/equipment/F8/112 Mask aligner - LOMO/diary.txt; record:3 (new)

Record status	<input type="checkbox"/> HOT (this lot has hot lot status) <input type="checkbox"/> RESERVATION (need for equipment at known time) <input type="checkbox"/> QUEUE (wafers are ready for processing) <input type="checkbox"/> LOADED (wafers are loaden into furnace / equipment) <input type="checkbox"/> REWORK (these are rework wafers) <input type="checkbox"/> FAIL (this step failed)
User,date,time:	Paula Heikkilä 15/11/2012 13:40
Project	Maintenance [#Nanofab Aalto]Veli-Matti Airaksin
Lot	-
Step	
Hours	0.25
Wafers	0 pcs
Recipe	NN
Comment	Equipment is not there. However sample was Si coated with SiO2 + Al

Send data

- Pick your name from the drop-down menu.
- Choose your project. Note: You should use projects of your own group – unless by permission you are working for another group’s project.
- Input in the Hours field **the total time you have reserved the equipment for your job**.
- Choose correct Lot for your task. (Optional; you first have to input data for your Lot in “Lots”)
- Step, Wafers, Recipe are optional and you can use them if you like.
- Write any useful information in the Comment field – this is the diary.
- Press *Send data*

Your diary entry is now done. You can later update or correct the data.

RECORDING HOURS OF USE

- Input in the Hours field **the total time you have reserved the equipment for your job.**
- This time starts when you arrive at the tool (or your booking starts, whichever is earlier) and ends when you release the tool for other users.
- Some tools can have very long process times, even up to 2 days (e.g. ALD, oxidation, EBL).

If the run ends during the night, leave out from the PESO entry the idling time until following morning 08:00. (During weekends until 08:00 Monday morning, if no other users were booked for the weekend.)

NOTE: for academic users the invoicing is limited by the maximum billable times defined for all tools.

For instance for ALD this maximum is 8 hours.

THERE IS NO NEED TO TO TRICK THE SYSTEM. STAY HONEST!

If the tool doesn't work properly or doesn't work at all:

- Record your findings in the Comment field of PESO.
- Inform other users by selecting correct STATUS for the tool.

STATUS classes are:

1. OK
 - Tool is operational and in perfect condition.
2. SCHEDULED MAINTENANCE
 - Preventive maintenance under way.
3. DOWN
 - Tool is unusable due to faults.
4. OUT OF USE
 - Tool basically OK, but has been taken out of use (e.g. due to facility problems).
5. PROBLEMS
 - Tool has problems but can be used. Specify in diary. Inform the Main User You can find his contact information in PESO user list and in LIMS.

CHANGE TOOL STATUS

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-In the diary click *Status*



112 Mask aligner - LOMO diary

New Record Diary Meas Status Config Admin Header HELP

#	Date	Time	User	Project	Lot	Step	Hours	Wafers	Recipe	Comment
3	15/11/2012	13:40	Paula Heikkilä	Nanofab Aalto Nanofab maintenance	-		0.25	0 pcs	NN	Equipment is not there. However sample was Si coated with SiO2 Al

- Click *New Record*



112 Mask aligner - LOMO status

New Record Diary Meas Status Config Admin Header HELP

#	Status	Date	Time	User
5	OK	26/10/2012	12:07	Victor Ovchinnikov
4	OUT OF USE	19/10/2012	16:31	Paula Heikkilä
3	OK	19/10/2012	16:16	Paula Heikkilä
2	OUT OF USE	19/10/2012	16:08	Paula Heikkilä
1	OUT OF USE	16/10/2012	12:21	Veli-Matti Airaksinen
0	OK	08/09/2010	09:23	-

CHANGE TOOL STATUS

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File :monitor/equipment/F8/112 Mask aligner - LOMO/status.txt; record:6 (new)

Record status	
User,date,time:	Paula Heikkilä 15/11/2012 14:34
Status	OK SCHEDULED MAINTENANCE - preplanned preventive main... DOWN - specify in diary OUT OF USE - but not broken PROBLEMS - but can be used, specify in diary

Send data

Choose the appropriate Status

Send data

Directory: monitor/equipment/F8

111 Mask aligner - Elvis	diary	measurements	status	OUT OF USE
112 Mask aligner - LOMO	diary	measurements	status	OUT OF USE

- Open the diary to specify the cause.
- To show the information on the bulletin board: open in diary HEADER. Record here your message.
Note: This information doesn't update immediately, the delay might be even two hours.

MEASUREMENTS

Equipment	diary	measurements	status	OK
101 Oxidation Furnace	diary	measurements	status	OK
102-1 LPCVD Furnace	diary	measurements	status	OK
102-2 LPCVD Furnace	diary	measurements	status	OK
102-3 LPCVD Furnace	diary	measurements	status	OK
103 Ellipsometer	diary	measurements	status	OK

- The *measurements* link by each equipment is for your own results, and is a good way of keeping track of your work and of equipment conditions. These can be modified to some degree to fit the different equipment if needed.

File: monitor/equipment/F7/101 Oxidation Furnace/measurements.txt record:0 (new) HELP

Record status	DELETE <input type="checkbox"/>
User, date, time:	<input type="text" value="06/09/2010"/> <input type="text" value="11:58"/>
Recipe	<input type="text"/>
Lot	<input type="text"/>
Step	<input type="text"/>
Wafer	<input type="text"/>
Meas1-N	<input type="text"/>
Meas2-W	<input type="text"/>
Meas3-C	<input type="text"/>
Meas4-E	<input type="text"/>
Meas5-S	<input type="text"/>
NoSPC	<input type="text"/>
Comment	<input type="text"/>

Reset Form Send data

- Note that dots "." are used as decimal separators.
- By putting in "YES" in the NoSPC field the measurement will not be taken into account in SPC analysis.

SPECIAL ISSUE: USE OF VTT'S EQUIPMENT

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- Most of VTT's tools in the M2 cleanroom are also accessible for Aalto's users.

Training and permissions:

- Contact equipment responsible person through LIMS for user training.
- You may use the equipment after given the permission by the equipment responsible person.

➤ Database

- VTT has a separate Process Registration Database (similar to PESO).
- Register your use in the database in the normal way.
- You do not need your own project in VTT's database – just use the generic project **82376-1.0 Aalto_2013**.
- **Important: If you require invoicing of your VTT tool use from a specific project note it in the "comments" field** (this will greatly help the long-suffering controller of your department)!

SPECIAL ISSUE: PROCESSING FOR OTHERS

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- You may use equipment to perform processing / measurement services. For instance for a cleanroom user who does not have permission to use the tool; or for a researcher who does not have access to the cleanroom.

Do the following:

- Check whether your "Client" has a project in PESO.

➤ **If your Client has a project in PESO:**

- Use this project to log your equipment use – then our invoicing will find the right target!

➤ **If your Client does not have a project in PESO:**

- Give her our standard "**Nanofab Processing Order**" form to fill. This form has to be signed by the Project Leader. The Client should send the signed form directly to the Cleanroom Engineer.
- Cleanroom Engineer creates the project in PESO and sends notification to you (and Nanofab's assistant Controller).
- You may now do the processing. Log use in PESO using the Client's project!

SPECIAL ISSUE: MAINTAINING STANDARD PROCESSES

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- Occasionally before a tool can be used, the performance of a standard process has to be validated (i.e. after major maintenance), or special maintenance runs have to be run on the tool (i.e. cleaning runs).
- **Process validation/qualification:**
 - Contact the Main User and get her permission.
 - Perform process validation.
 - Log equipment use and data in PESO, project "Training and Process Support".
- **Cleaning Runs**
 - Cleaning runs are specified in the short user manual.
 - Perform cleaning run.
 - Log equipment use and data in PESO, project "Training and Process Support".
- **If in doubt – contact Main User or Nanofab personnel.**

SPECIAL ISSUE: DEVELOPING NEW PROCESS

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- Generally you'll be using standard recipes in each tool. Only basic parameters may be adjusted (e.g. processing time.). These are defined for each process.
- Occasionally, standard processes do not produce the required results and a significantly modified process may be required.

Do the following:

- Contact Main User and discuss process requirements with him.
- If the Main User likes the idea, fill in our document "**Nanofab Process Development Plan**".
- Main User decides whether the new process is potentially generally useful, and could thus become a new Standard Process.

➤ **If new process is intended for a Standard Process:**

- Main User submits the Process Development Plan to Nanofab for approval.
- After the plan has been approved, process development can proceed.
- Main User logs worktime for process development on "Training and Process Support".
- Equipment Use by the user is also logged on "Training and Process Support".

➤ **If new process will not become a Standard Process:**

- Process development can proceed under the supervision of the Main User.
- Main User logs worktime for process development on "Training and Process Support".
- **But: equipment use is logged on the user's own project.**

To check whether a certain person is among PESO users:

- Click on "Users" on the left menu to get a list of all users.
- Listed in alphabetical order by default, can be reordered by clicking on the name of each column.
- Remember to check that your own data is correct. If not, contact Cleanroom Engineer.

Bulletin board	monitor operator	Create new record	Configuration	admin	Edit Header	
F7 Furnace	#	**User**	tel	Group	Removed	comment
F8 Lithography	0	--	-	-		-
F9 Materials	5	Aapo Varpula	050 3748060	EPG		mvarpula@cc.hut.fi
F10 Plasma	110	Aarni Iho		Photonics		
F11 Wafers	82	Aaro Väkeväinen	050 4007348	Quantum Dynamics		avakevai@cc.hut.fi
F12 Chemistry	3	Abuduwayi Aierken	044 5115731	Nanotechnology		abuduwayi.aierken@tkk.fi
R13 Nanolab	91	Aleksandr Kravchenko		Optics		aleksandr.kravchenko@tkk.fi
R15 Thin film lab	65	Alex Perros Pyymaki	050 9334918	Nanotechnology		alexp82@cc.hut.fi
MBE Lab 1020	135	Alexander Savin		Nano		
Lab 1151	64	Alexei Bouravleuv	0465884774	Nanotechnology		bour@mail.ioffe.ru
Lab 1152	111	Ali Muhammad	044 9205718	Opto		muali@cc.hut.fi
Supporting equipment	72	Amit Khanna	044 3777901	Photonics		amitkhanna49@yahoo.com
4th floor labs	69	Anders Olsson	0407346262	Nanotechnology (Jukka Tulkki)		aolsson@cc.hut.fi
Facility	121	Andiy Shevchenko		Optics		
LOGFILE	99	Andrei Pavlov	050 4210191	Scannano		andrei.pavlov@scannano.com
users	78	Anshul Rao	044 9344525	MFG		ganshurao@hotmail.com
lots	80	Anssi Tölä		EPT		atolo@cc.hut.fi
projects	115	Antti Haara-Hiltunen	22330	EPG		
lot/project info	89	Antti Havukainen	23214	Optics		ahavukai@cc.hut.fi
runsheets	6	Antti J. Niskanen	0503099114	MEL		aniskane@cc.hut.fi
NanoWiki	7	Antti Peltonen	0503161030	Micronova Nanofab		antti.peltonen@tkk.fi
version	132	Antti Räisänen		Dep of Radio Science and Engineering		
change log	8	Antti Sämanniöki	040 7427493	Nanotechnology		antti.sammanio@tkk.fi

- The sample(s) or wafer(s) you are currently processing are called a "Lot". By clearly identifying your samples (Lots) you'll find it much easier to track your work later on. **It's worth the trouble!**
- Before starting work on any tool in the cleanroom, start by filling in the lot name.
- Click on *LOTS* in the menu on the left.
- If your lot isn't in the list already, create a new one by clicking *New record* in the top menu.
- You can edit the Lot by clicking the Lot number.

File :monitor/prosohje.lst;
record:251

Record status	<input type="checkbox"/> HOT (this lot has hot lot status) <input type="checkbox"/> QUEUE (check this for a hot lot) <input type="checkbox"/> DELETE (this is final, there is "NO" undelete)		
User,date,time:	Paula Heikkila	21/11/2012	15:20
Principal-Scientist	Veli-Matti Airaksinen		
Project	Aalto Nanofab Aalto Nanofab		
Lot	PAULA's LOT		
Ready	<input type="checkbox"/> Ready		
StartDate	21/11/2012		
EndDate	22/11/2012		
Comment	DEMO		

-Pick *your name* from the drop down menu (User), current date & time are filled in automatically.

-Pick the *Principal Scientist* (group leader/person in charge of the project) from the drop down menu.

-Pick the *Project* name from the drop down menu.

-Fill in the name of your "Lot" (each lot has to have an unique name).

-Start date is automatically filled in, end date should be a "-" sign until the lot processing is completed, then you can fill in "yes" in the Ready box.

-Send data adds the lot to the system.