



CLEANROOM SAFETY INTRODUCTION

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Micronova is a joint research centre of



- VTT Technical Research Centre of Finland (2900 people, 316 M€ turnover)



Aalto University
School of Electrical
Engineering

- Aalto University (20 000 students, 5000 staff (370 professors), 418 M€ funding)



- Established in 2002
- 5th generation cleanroom facility on our campus since 1970's
- National Research Infrastructure since 2009
- 370 personnel
- 60 PhD students
- Cleanroom, RF, Cryo, Circuit and component design, lasers and optics, simulation and modeling

- <http://www.micronova.fi/>



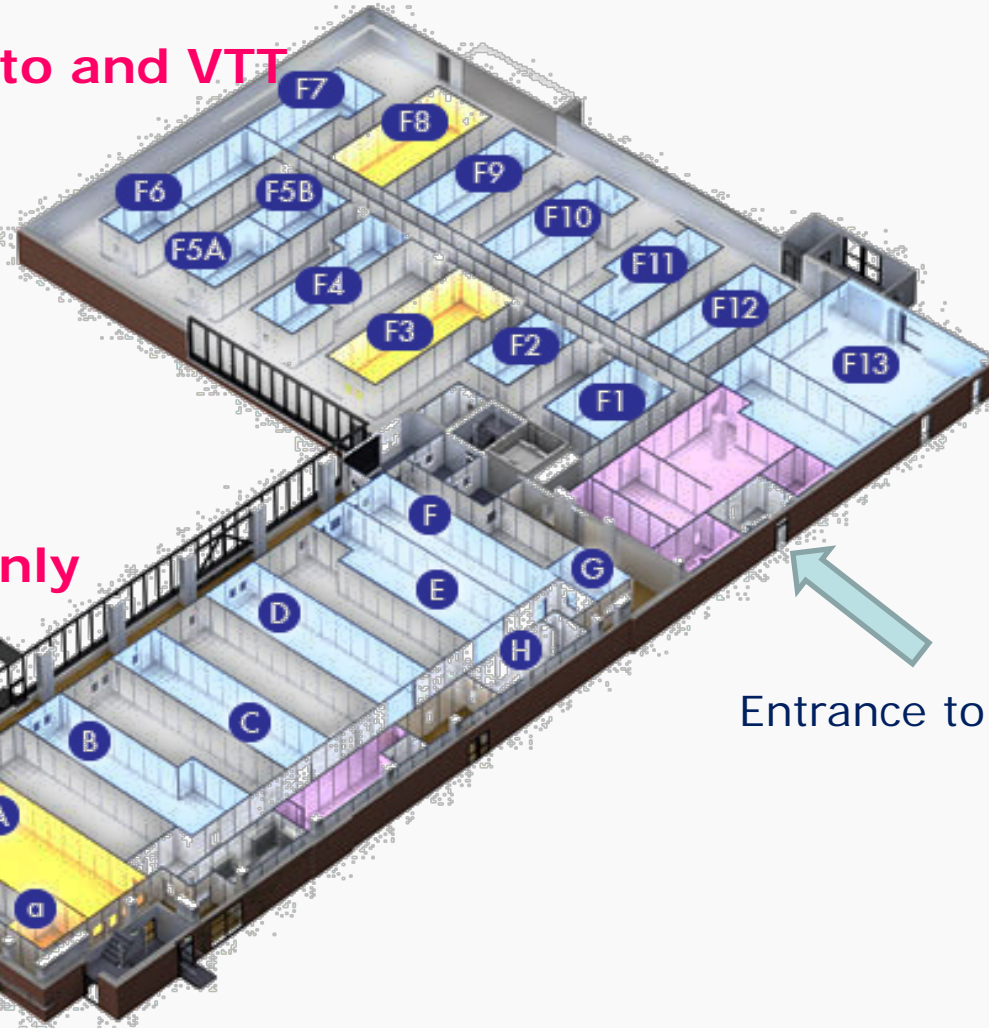
Cleanroom



Cleanroom Layout

M2 joint cleanroom

Aalto and VTT



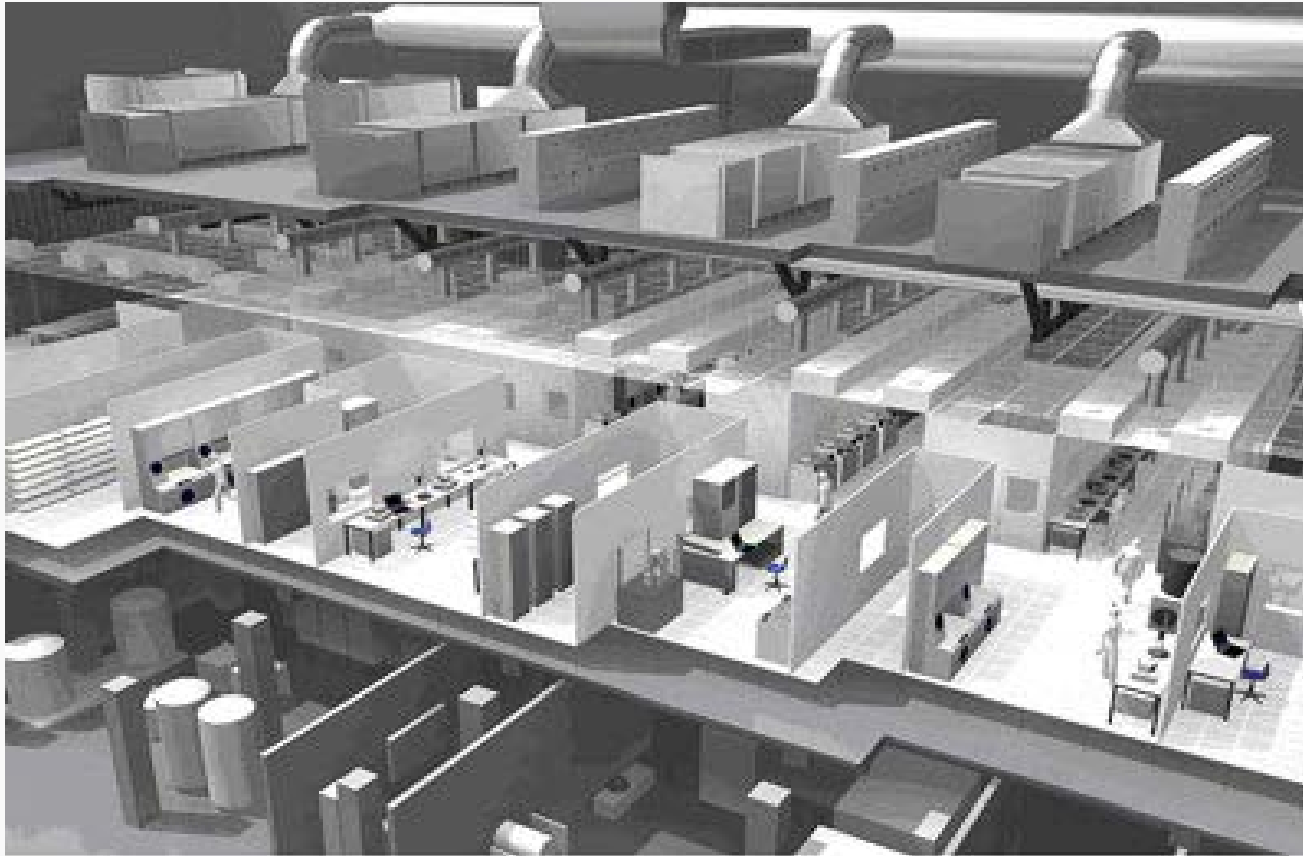
M1 VTT only

M2 cleanroom bays

- F1 Flip-chip Bonding
- F2 Wet Processing
- F3 Nanolithography
- F4 Plasma and Sputtering
- F5 Plating
- F6 Metrology
- F7 Furnace
- F8 Lithography
- F9 ALD
- F10 Plasma
- F11 Wafers
- F12 Chemistry
- F13 Analysis Lab



Structure of the Cleanroom



Air conditioning plant

4th floor; processes incoming outside air.

Plenum

3rd floor; recirculates air through filter-fans into the cleanroom

Cleanroom

2nd floor

Subfab

1st floor; support systems for gases, chemicals, water, waste, pumps

Overpressure in the cleanroom:

- Clean bays 35Pa
- Service areas 25Pa
- Gowning 15Pa

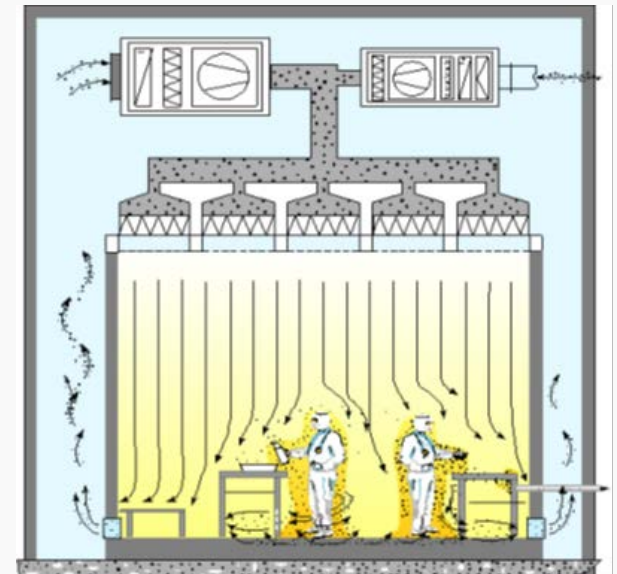


Cleanroom Guidelines

Clean Ways of Working



- You must wear protective clothing: overalls, booties, face mask, gloves and goggles.
You will find instructions in the airlock and gowning area.
- Clean air is flowing down from the ceiling. Lower means dirtier!
- You must remember that contamination may spoil not only your own work but that of others!
- Desks, equipment, wetbenches, fumehoods are not storage space!
- Only **you** can make sure that the workstation is clean and tidy for the next user.





Clean Ways of Working

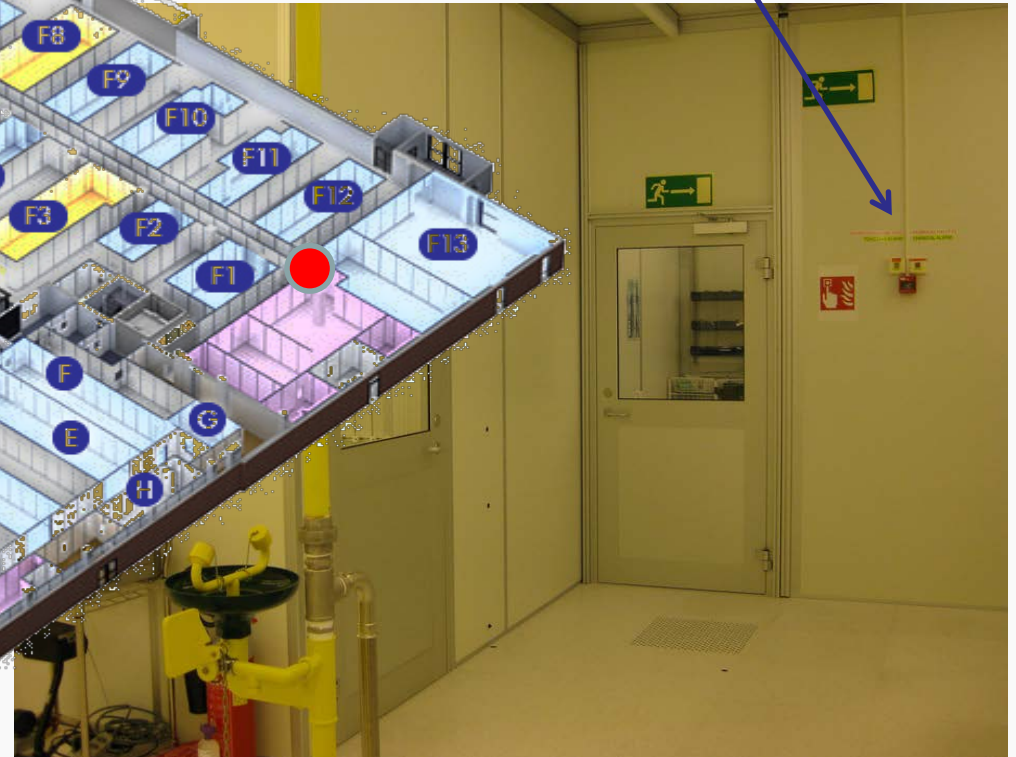
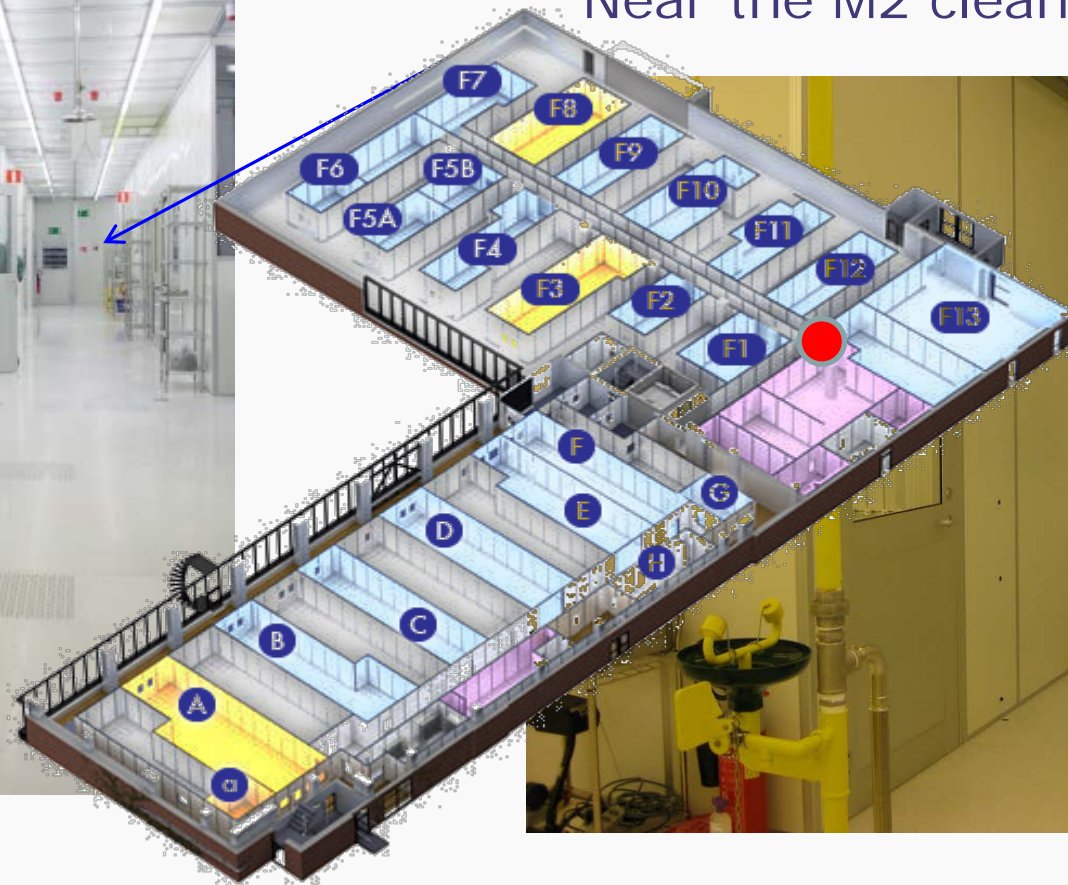
- Avoid rapid walking and quick motions that create turbulence.
- Do not use the floor or tables for storage.
- Clean all items which have been on the floor .
- Do not touch your face/eyes with gloves.
- Do not lean on the wet benches or equipment
- Do not sit on tables.
- If you suspect that your gloves are dirty, change them!
- No food, drinks, cigarettes or chewing gum are allowed.
- Do not bring any notebooks or papers. Suitable paper is available in the cleanroom.
- Forbidden items: Pencils, cardboard, Styrofoam, tissues, **mobile phones** (only handsfree) **and cameras** (one publicly available inside the cleanroom – F10)



Cleanroom alarms

- Fire alarm
- Toxic gas alarm
- Chemical alarm

Near the M2 cleanroom entrance

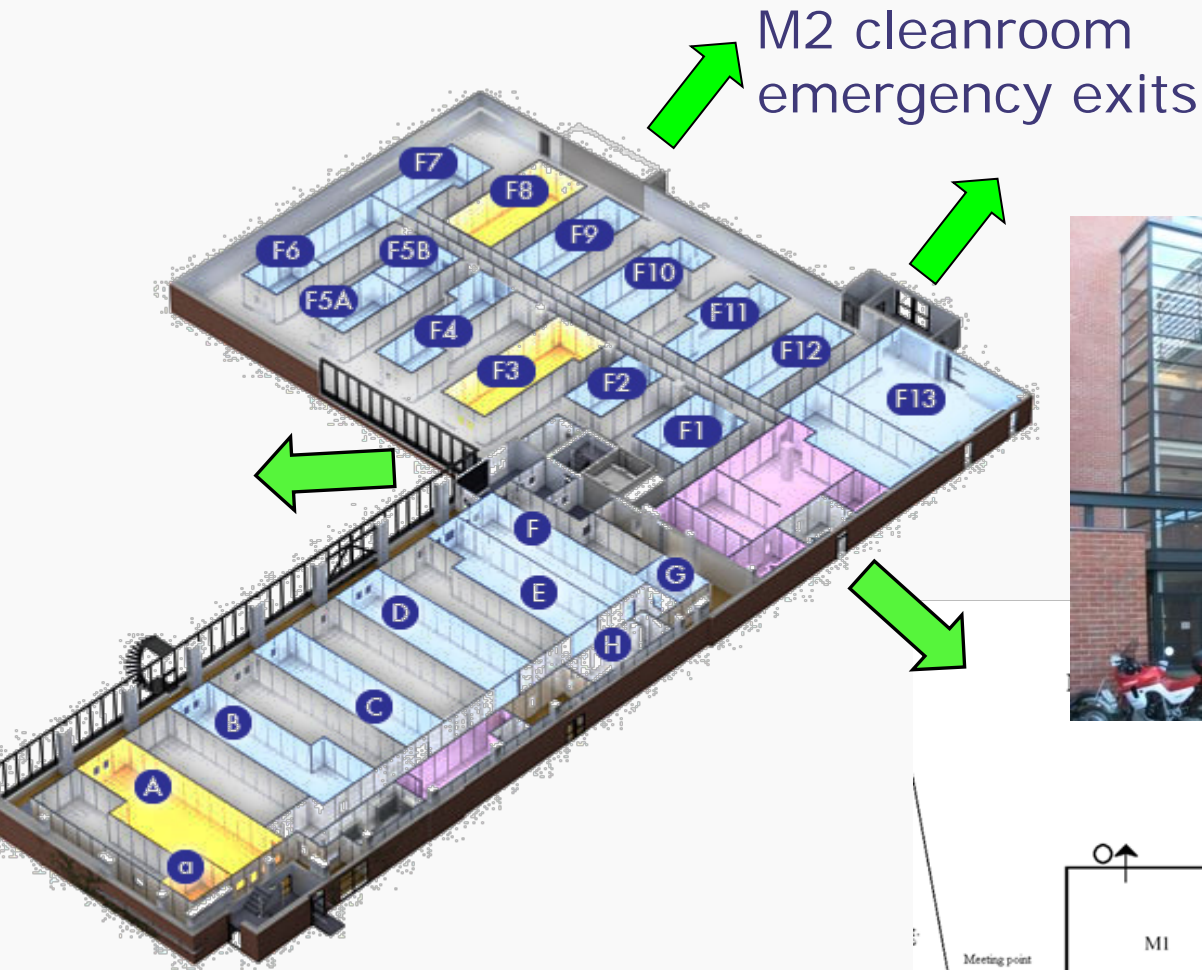




Action During an Alarm

- Look around and help your colleagues if they need it.
- Leave the cleanroom (as well as the offices) using the nearest emergency exit.
- Keep calm, do not rush.
- Go to the assembly point.
 - In case of a chemical alarm (in the cleanroom only) go to your office.
- Do not remove your overalls before you are in the assembly point.
- Wait for permission to enter the building or cleanroom.

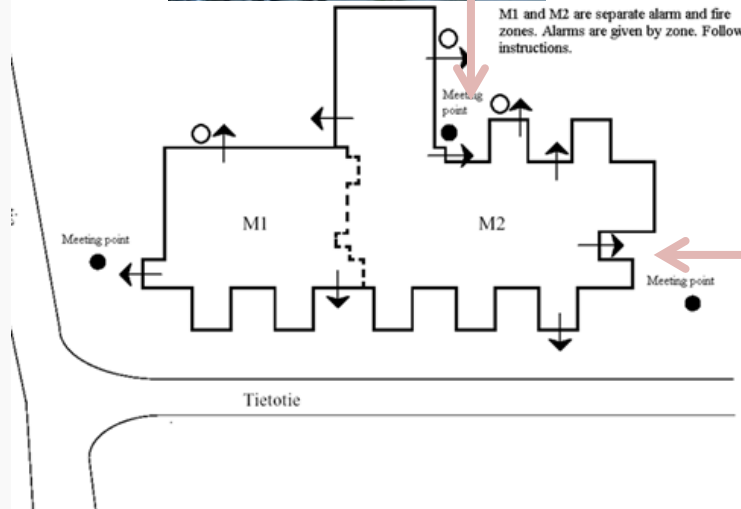
Cleanroom Exits and Assembly Points



Assembly points

D door

Main entrance



M1 and M2 are separate alarm and fire zones. Alarms are given by zone. Follow instructions.



First Aid in Chemical Accident



Undress.
Call for help.
Use the emergency shower.
At least 10 minutes.



Use eye wash if necessary.
10 minutes!



Contamination



- You always have to use gloves in the cleanroom.
- When you are handling chemicals use thick chemical gloves on the usual cleanroom gloves.
- If you are working with small substrates and the chemical gloves are too thick, use double gloves.
- Use double gloves during messy tasks, such as resist work in the lithography.
- Remember that the chemical resistance of gloves varies with the glove material.





Sources of Particles

- **Operators (40-90% of the contamination)**
 - People generate particles in the form of skin flakes, lint, cosmetics and respiratory emissions
- **Materials (substrates like silicon and glass)**
- **Substrate handling**
- **Tools and containers (e.g. quartz boats and tubes)**
- **Gases**
- **Chemicals (there can be unwanted reactions)**
- **Processes**
- **Maintenance work**

- **Change gloves when you change working area to the another cleanroom bay.**



Additional Information

Micronova's cleanroom is a complex environment with over 250 users, 30 supporting staff and over 330 equipment listed on LIMS.

It will take time for you to learn most of what you need. Your knowledge will never be complete as changes happen continuously.

Here are some useful sources of additional information:

- **Micronova Nanofab Cleanroom Guide:**

Cleanroom operation and safety information, updated annually.

- **LIMS Newsletter:**

Short, weekly newsletter to cleanroom users with important current information. Read it.

- **LIMS:**

Documentation: manuals, MSDS, etc.

- **Display** outside cleanroom entrance:

Current information.

- **Main Users and Nanofab's personnel** are glad to help. Just ask.