Mathematical Aspects of Biomedical Electronic System Design
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Lecture 32
Cleanroom Entry Demonstration

Hello, welcome all. Today, we are going to see how to enter a Cleanroom, what is cleanroom that is the first question that will come to everyone's mind. Cleanroom is a controlled environment in a confined space which is developed to ensure that there are almost minimal dust particles or impurities in the surrounding area. Why this is done? This is done to ensure that the kind of fabrication that we do at micron scale or at nanoscale is done without any kind of contamination on the devices.

Depending upon the amount of contamination, cleanroom are classified. The classification is based on the fact how many particles greater than zero-point five micron are present in a cubic meter. So, if there are 100 particles in a cubic meter greater than the size of zero-point five micron it will be called as class hundred, similarly, class 1000 and class 10000.

The Cleanroom that we are going to enter now is class 1000 to class 10000. So, now let us see, how to enter a cleanroom? Because most of the people who are working in the field of micro fabrication or nano fabrication must know how to enter a Cleanroom. So, now my colleague will show how, what is the process?

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So, the first step to enter a Cleanroom is to remove your shoes, this reduces the extent of the contamination. And now you can see as he is keeping the shoes in a designated place. After removing the shoes, the next step is to access the Cleanroom using a biometric entry.

And now, the process next to this is dawning of the Cleanroom gown. Dawning of the Cleanroom gown is a process that requires sequential steps to be followed swiftly. The first step to wear is masks. As you can see, my colleague is wearing another mask on top of the existing mask due to Covid protocols. Then the next step is to wear a hairnet. Hairnet is used to prevent any kind of particle or hair falling onto a device on the Cleanroom floor.

Next step, is to wear shoe covers. Shoe covers are meant to prevent any kind of dust particles from our feet when we are entering the premise of the Cleanroom. After wearing shoe covers the next step is to down the Cleanroom gown. Cleanroom gowns is the next step towards the

Cleanroom entry. These gowns are specially dedicated gowns or cover all suits, designed for working in a Cleanroom environment. They do not generate any kind of dust or clothes like particle or fibre light particles. They also are static protected, static charge protected.

Now, my colleague showing with the process of wearing a Cleanroom gown. The Cleanroom gown is the second last step, after which the last step of entering the Cleanroom is wearing gloves. There are special gloves of different types which are out of the scope of this particular session, but the first and the foremost protection layer for hands is latex gloves. Before we wear the gloves, the step which is required to be completed is wearing Cleanroom shoes. As you can see, my colleague is wearing a static protected, static charge protected Cleanroom shoes.

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Now, the next step will be to wear Cleanroom gloves. These are nitrile gloves which have resisted to weak chemicals. These gloves can be used while working with solvents like acetone or ipl. And they are powder free, which means they do not generate any kind of dust particles, even on the hand when they are wore.

So, till now we have seen how to wear a Cleanroom gown, how to wear different parts which are required to be used in order to cover maximum body parts exposed. All this process, in all is required to reduce the number of dust particles generated as you enter the Cleanroom. So, this is how Cleanroom entry is made.

So, the final step before we enter the Cleanroom is to step on a sticky mat. This is a mat which is put up dedicatedly at that particular spot just before entering the Cleanroom so that whatever dust particles are there on the shoes are taken care of. This is how we enter a Cleanroom. So, now we will see how to remove the Cleanroom or how to deep Cleanroom gown or exit a Cleanroom, the process is also called doffing of the gown. My colleague will now demonstrate the process.

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The first step is to remove the gloves as these are the most contaminated accessory that a Cleanroom user wears. Since we come in contact with various chemicals, the first and the foremost step should be removal of the gloves, followed by removal of the Cleanroom gown.

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Before we don the Cleanroom gown, as we can see, the next two steps are to remove the hairnet and the mask. The next step is now to remove the Cleanroom gown. Cleanroom gowns should be wore by a single user and the same gown should not be wore by another user and it should be placed at a designated place from where it was taken.

These are some Cleanroom disciplines that one has to follow in order to maintain the cleanliness of the Cleanroom and also to prevent any kind of cross contamination. The whole idea of using a dedicated gown is to prevent the cross contamination which is one of the major causes of device failure in a Cleanroom environment. So, as you can see the Cleanroom gown is being placed at a designated place from where it was taken.

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The final step before exiting the Cleanroom is to remove the shoe cover. It is important to remove the shoe cover after crossing the bench. Bench acts as a barrier to prevent any kind of dust from the socks or from the feet of the user. Again, the exit of the shoe can be done by pressing the exit button and then closing the door. So, this is how we can exit the Cleanroom.