

**Product Engineering and Design Thinking**  
**Prof. Pranab Kumar Dan**  
**Rajendra Mishra School of Engineering Entrepreneurship**  
**Indian Institute of Technology, Kharagpur**

**Module - 03**  
**Design Thinking and Concept Development**  
**Lecture - 12**  
**Product specification and related methods**

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How to find a problem to solve ?

- In conceptual design we describe an idea or a solution. The main word embodied in it is 'concept'.
- It is one of the most important phase of product development.
- Before trying to solve a problem, we need to find it.
- There are many ways and methods
- Later we need to create a product specification document
  
- In this class we would have some experience of real world scenarios of problem understanding.
  
- Knowledge from the potential buyer of the product or the custo source of information.



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## Exercise - 1

### Improper Cleaning in Hostel



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Hello everyone, and thank you for coming today's session. We will be solving a problem which we has been already identified and then we will be using multiple different steps to solve the problem. So, now I request Vikalp to actually express the problem in detail and the next step will be that all three of you will be requested to ask questions, to identify the problem a more and know the problem in detail and try to see what exactly the problem is yeah to Vikalp.

Yeah. So, hello everyone. So, on the first stage of problem identification, since you all know, we have been living in a hostel life for the past 6 to 7 years. So, we all know what are the problems that we are facing in the hostel itself. So, the major problem that we are facing here is that improper cleaning and or inefficiency in the cleaning in the boys' hostels. And this is the very journal and common problem that we all face.

So, I have been in touch with the cleaning staff of our hostel itself and I have gathered some information regarding what the problems, the cleaning staff is facing and due to which there is lack in improper cleaning is there also.

Now, that we know this is a problem. Do you understand the problem in depth or do you have any questions regarding the problem? And you can ask, really ask.

No sir.

So, you understood the problem.

Yes sir.

And, what about you?

Yes sir I have understood the question yes I have understood the question clearly. Like it is regarding for the cleanliness purpose in the hostel, especially in boys' hostel. So, yes, it is totally understandable.

Yeah it is sir first of all, the timing of cleaning staff is.

Yeah.

Quite different from the students morning time and classes time. And the that whenever we want that that cleaning staff, whenever we means ask the cleaning staff to come in their our in our room, they totally avoids totally avoid. And there is no proper a that spread sheet or that time schedules of the cleaning staff that you have to means knock the door at what time and what time the students are available.

And means what type of cleaning they want that. Sometimes they use just a water. They did not use any chemical. They are not means doing their work in proper manner.

Ok. So, we can, as my fellow has told about the brief about the problem. So, we can identify the problems in respect to certain categories. For example, like he told about the timings.

Hm.

So, we can say, yes, the timings is one of the factor here itself. Second, he told about the number of the resources.

Ha.

Or the equipments.

Tell him a detail.

That a proper cleaning staff should have. So, the cleaning staff, one of the problem is should be that cleaning the resources are not there. Another, what I perceive is that you are saying that there is a lack of a proper structured timetable.

Hm.

That at what time they should come to the room for the cleaning.

Yeah.

As compared to the timings of the classes of the students.

Yeah.

Yes.

Ok.

So, those are basically solutions. Those are solutions, possible solution? But right now we are thinking about only problem. What exactly the problem is? Problem is that one is the timing.

If one person is working in that in one floor, first floor, second floor and third floor. Like they are means divided, all the floor floors for each every staffs. But the bathroom section and that room section staffs; it is its totally different as compared to means if we see in our department.

That when we requested those person that please do the cleaning as means do means do the cleaning properly. But they did not listen our words because they told us that we are not that permanent staff. And we so, why we do this do this thin?

One thing I want to add into this is that apart from the proper timetable, if he we even schedule a timetable, they tend to come according to their own wish. Like which room they have to start, like from east side they have to start or from the west side they have to start.

And after that they just ask for that, like that you do you want cleaning. But due to the timing clash of student with the classes, they just ask it for the sake of the thing that students should avoid that thing. And they tend to get refusal from that. So, they do not do not work according to that.

And the second thing is the like there are a less number of people who are employed in this. So, the staff should be increased. So, that proper timing should be given to them. One of the another problem is that during the cleaning, the housekeeping staff tend to clean only the open space.

Apart from the other things that need to be cleaned like under the bed or the windowpanes and the ceiling fans, that they just do on saying, if we will not say they will not do it for a year also. So, that things also need to be done properly. Just they do it in the open space and they left all other things.

Yeah. Ok.

So, we can I think we can add this point into the sincerity of and the attitude of the

Yeah. Yeah.

Cleaning staff. We can add this point to that also, ok.

Ok, do sincerely.

Ok. So, one of the major problem that I have seen is in hostel the sleep cycle of each student is very different. Like some of the students sleep at 3 am and wake up at 11, some sleep at 5 am and wake up at 12. And for the cleaning staff, their time is fixed like, they need to clean their room specifically between the 8 to 10 am. So, what happens is there is a mismatch between the timings. So, what happens is they generally knock the door and students do not do not open it.

So, due to this reason what happens is they are unable to clean those particular rooms. For those students who sleep cycle is very different from the from the normal one. So, this is one of the problems that I feel is very very important. Another problem related to washrooms that I see is what happens is due to the lack of water, the flush, like the students do not flush. So, here basically the water like the lack of water is there. So, here there is no like, the cleaning staff is not responsible for it.

But majorly I would say the department like the like the authority who is responsible for the water management. I think that in that particular moment that department is responsible for

that where the water sometimes not comes and due to which it raises to the problems like this flushing type of problem and which like rises the problem of this unhygienic conditions. So, this is these are some of the problems which I think are important.

Ok, good, thank you. So, let us have the conclusion that we have listed down all the problems.

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#### Problems Identified

- Timing of cleaning staff and students clashes
- No schedule of cleaning for rooms
- Lack of resources/equipment for cleaning
- Lack of sincerity of cleaning staff
- Cleaning only in open spaces (no cleaning in confined spaces)
- Improper water management



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## Exercise – 2

### Poor Space Management in Workshop



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Yeah, hello everyone and thank you for participating in this exercise; in this exercise we are going to take a problem and understanding depth and then try to solve it using a method. And then we are going to evaluate also so, the problem what Vikalp has understood that there is a lack of space in the workshop. And so, you can explain the problem in more depth.

Yes sir. So, here we are with the second exercise regarding with that the lack of enough space in our workshop and is there as improper space management in our workshop itself. So, what we are going to do, we have to first identify the all the types of problems that we are going to face because of this major issue So, the first problem that what I think is that since a workshop consists of large machines itself and many students, the staff has to work along with the many students.



So, I think what I think is that the problem what we are facing of the space management that that at a time, at a particular time, too many students are to have the classroom in the small spaced in a confined space workshop. So, what I think is that too many students at a time is a major issue in that.

In addition to that, what I have observed is like in order to accommodate large number of machines, more number of machines, the space between the subsequent machines is very small. So, one operator who is working on a machine and a second operator who is working on a different machine often collides with one another because the space between the machines is very small. So, that also I think need to be taken care of.

According to me, the next problem that could be a according to space management, like working area where the students or works of staffs are working, that should be well, like the area should be enough. So, that [FL] amount of number of students and works of staffs can accommodate in that area too. Like suppose we are working in particular area and the area available is that much not, the that is not much enough. So, that 10 or 12 member can stand properly and do their job. So, according to me, that could be a problem.

So, mean you mean to say that the space between respective machines is not according to the standards rules and regulations.

Yeah.

That has to be.

Yeah.

There, ok. So,.

Yeah. Regarding the problem that we are facing, regarding the space management in a workshop, is that the crowding is the one of the main issue. If your students are in large

numbers and the skilled and the skilled workers, they are not able to manage the space according to the units, proper units.

So, if you can if the characterization is proper of the of the space, then the students can be managed easily and the crowding and also the proper working and all the operations during the machining operation any other operation can be done very efficiently.

So, one more major problem because of this less space that we are also facing, that because since in a very confined space, we tend to see that for example, the casting process is going on at a very confined space and close to that the other machines are also there.

Hm.

So, for a particular casting process, there is a very lack, there is an improper ventilation issue with that because of the confined space. So, it often tends to affect that the it is not a proper condition to work upon. So, because of this space, I think the ventilation is not as much good as it can be.

In addition to that ventilation problem, we have seen that in our workshop, the windows are not completely sealed. So, in summer times or in the dry in the dry season, when the wind is very like very rapid here, in the speed of the wind is very high in these conditions then, we see that the dust particles, the sand particles often enters the workshop and it contaminates the, in all the machines, even it affects the eyes of the operator and it becomes very difficult to work in that situation.

So, for that even the ventilation should be proper and the windows also should be like should not be in the state which they are now.

So, one another major problem that I have seen that the emergency exits, in case of than emergency, although we have the number of emergency exits, but in case of an emergency,

there are so many peoples. And if any miss happening happens. So, emergency doors are, I do not think it is of in a sufficient big doors are there.

Even the number is less.

Yeah even the number is less. So, what I can say is the less number of emergency exits with smaller sizes. This is the main problem.

In continuation to that ah, we have seen that in order to install new machines and to make separate compartments, one of the door which was, which had a ramp is now inaccessible, is not accessible because the new compartment had been built and the door has been permanently shut.

Ok, we (Refer Time: 14:00).

In the workshop.

So, what we can say that due to insufficient planning, the existing facilities was shut down because of new facilities that has been brought.

Yeah.

Ok.

Because of the improper designing and the air ventilation issue, if any natural disaster may happen, so, for that case like fire or any other disaster. The students or the any staff members cannot easily I mean exit through the doors because of the improper position of the machines at the improper places. So, in this one is a major problem that need to be verified for the proper planning of the workshop facilities.

Like other than improper entry as well as fire hazards all those, are there is other problem also. Like in when we visit our workshop, you can see lot of scraps are laying over different different corners and that is taking lot of space of the workshop that is not being used properly.

Ok.

So, there is a lack of store room. So, that we can dump our scraps and like scraps and as well as unused components that are not.

Raw material.

Being used.

Raw materials.

Like raw material along with the, like if you have to do going to do machining. So, scrap is something like chips, bursts.

(Refer Time: 15:25).

That are forming.

So, you use to.

Unused.

So, you use to.

Waste particles.

You mean to say that.

Waste materials.

Because of this lack of.

This.

Improper waste management, it is directly affecting our space management.

Space management yeah.

Space management.

In the workshop.

There is a proper location for the exposure for the wastage.

Ok.

Like there should be a go to place for the raw material and go to place to dump the scraps.

Ok. One more problem that I had often tends to find out is that the tools that you we can see that there are so many tools and they which are designated to a particular machining operation. But since improper planning is there, the tools are not at a sufficient space like you can say tools can get intermixed. So, do not you think this can be a problem?

That the problem with related to the tools is because like most of the tools are used in all the shops that we have in workshop. Like the casting shop, forging shop, machining shop, the

different shops we have. But there is no clear demarcation where the one shop ends and the other shop starts.

Yes.

So, that is why the tools often gets interchanged among the shops and the operator or the students who are working on them. They have to look for the this specific instruments or the tools around the entire workshop and then they can find it. Like once who is working on one corner of the workshop often has to travel to the other corner to a long distance to find a tool specific tool which he needs.

Ha true.

Continuing to last problem that due to like there is a lack of tool kits as Gaurav and Vikalp suggested. Similarly, in our workshop you can find only one Aquaguard for water. And if our if a student is working at one of the corner in between if he feel thirsty he has to go the other corner of that. And that will again waste of time for him or any other member. So, due to lack of proper space there is less water purifier or you can say Aquaguard for to supply of drinking water.

Yeah In addition to that we can say that not only the drinking water the other facilities like students use if someone used to use water as a one of the resources. So, he has to travel a lot of distance for that. In addition to this what I have seen is that we can talk about the sitting area for the staff peoples that are already there.

Hm.

Although we know that in workshop people tends to work while standing, but when the work is not going on. So, what do you think that is the sitting area is sufficient enough, but because what I feel is that the number of staff persons are there. Maybe we can improve or the sufficient sitting area is not so, good.

Other than sitting area even we can see that sitting area is in between two different machines. I think there should be proper sitting room or compartment for them. So, that in between it will not. So, like they are sitting in current situation. They are sitting just in a open space that is in between two different kind of machines. There is a space they used to sit there. So, if someone is working in between those and he has to exchange then he has to go through different path to reach that proper machine. So.

Improper sitting arrangement.

Improper sitting arrangement.

(Refer Time: 18:46).

Or you can say they need to have a different room or compartment for the sitting area.

Ok.

In addition to that we have seen that there are many components in the workshop, which makes large like loud noise. So, I think they this machine should also have a separate compartment. So, that there like the noise can be compressed or it can be.

So.

Prevented from coming into the entire workshop. Because.

Noise pollution.

(Refer Time: 19:11).

Noise pollution.

There is insufficient soundproofing.

Like.

(Refer Time: 19:13).

Like.

(Refer Time: 19:15).

This is one of the major problem.

Like we have the air compressor which is used to regulate or supply the compressed air to the entire workshop through pipelines. So, there is a single compressor which is placed at one corner of the workshop. When that compressor is on the entire work we cannot speak there. We have to speak very loudly to communicate with one another. So, I think that compressor either it should be placed outside or separate chambers should be made so, that the sound damping can be obtained there.

The problem is that soundproofing is noisable.

And it is much more difficult for all the operators who stay entire day over there.

Hm.

And they have to so, like experience this loud noise through the throughout the day.

Ok and in addition to that I would also like to said that as you all know that for a particular machine to be operating it has to be operated at a particular parameters for example, temperature.



Hm.

So, what I have seen that for example, if an a machine that is required to that tends to go during machining a high temperature, then its temperature has to be controlled.

Hm.

But we do not have a sufficient air conditioning system for that. So, this is also an space management problem that because of this the machines often tends to break down. So, what I feel is that this is another big issue with that.

Similar with continuation to your problem like in our in present situation different machines are being arranged in a sequence manner. And like in between like suppose there is a two lathe machine next to it milling machine is placed. So, suppose that lathe machine requires some proper working condition, but milling machine is again placed nearby it and it has to work on suppose it has to work in different working condition.

So, due to lack of space they have a arranged in such a way, but they are not providings particular or like proper air conditioning as you say air conditioning for the working devices is much required, but it is not there in our workshop.

Yeah which is ultimately affecting?

Affecting the.

Our components (Refer Time: 21:11).

Component as well as efficiency of the machine.

Machines and staff people also.

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#### Problems Identified

- Less space between machines
- Overcrowding at a particular time on a machine
- Layout not as per standards
- Improper ventilation
- Windows are not properly sealed
- Less number of doors and available doors have small size
- No waste/scrap management
- No designated sitting area for workshop staff and students



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## Conclusion

- In this we had learn in the real world scenario how problem understanding is done.
- There are many methods, however you can use one of several of it.
- Directly asking the customers is one very good way for problem understanding.

