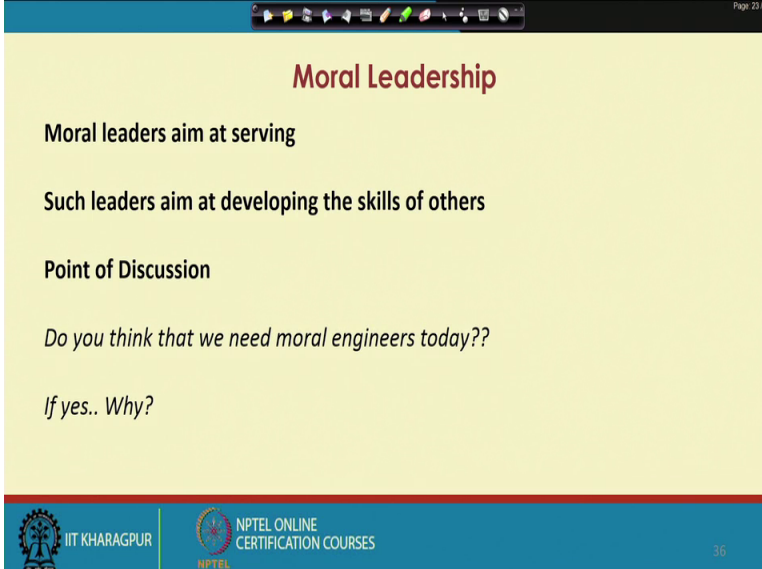


**Ethics in Engineering Practice**  
**Prof. Susmita Mukhopadhyay**  
**Vinod Gupta School of Management**  
**Indian Institute of Technology, Kharagpur**

**Lecture - 29**  
**Engineers as Managers Consultants and Leaders (Contd.)**

Welcome back. Now we will discuss about the role of engineers as moral leaders. In the past 2 sessions, we have discussed about engineers as managers, engineers as consultants, independent consultants. Today we will be focusing on role of engineers as moral leaders.

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**Moral Leadership**

Moral leaders aim at serving

Such leaders aim at developing the skills of others

**Point of Discussion**

*Do you think that we need moral engineers today??*

*If yes.. Why?*

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Why these are important? Why the moral leaders important today? So, their aim at like serving, their aim at developing the skills of others and there could be like questions of dilemma under each functions, where they need to take a decision, where taking into considerations the need of the situations conflict of interest, etcetera. So, that is where this moral leadership is important.

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**7 habits of highly moral leaders**

- Moral leaders have strong ethical character
- Moral Leaders have a Passion to “do right
- Moral Leaders are Morally Proactive
- Moral Leaders are Stakeholder Inclusive

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So, moving forward, first we will try to discuss about the 7 habits of highly moral leaders. So, they have strong ethical character. They have a passion to do right. They are morally proactive. They are like, they first try to think what are could be the implications of their actions may be not only short term, but long term implications and they try to take some proactive measures to find out what could be the degree of harm and how they what they can do to protect themselves from the harm. So and moral leaders are stakeholder inclusive means, they want to include the stakeholders all kind of stakeholders in their decision and they want to see the effect of the decisions on each of the stakeholders.

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Continued

- Moral Leaders have an Obsession with Fairness
- Moral Leaders are Principled Decision Makers
- Moral Leaders Integrate Ethics Wisdom with Management Wisdom

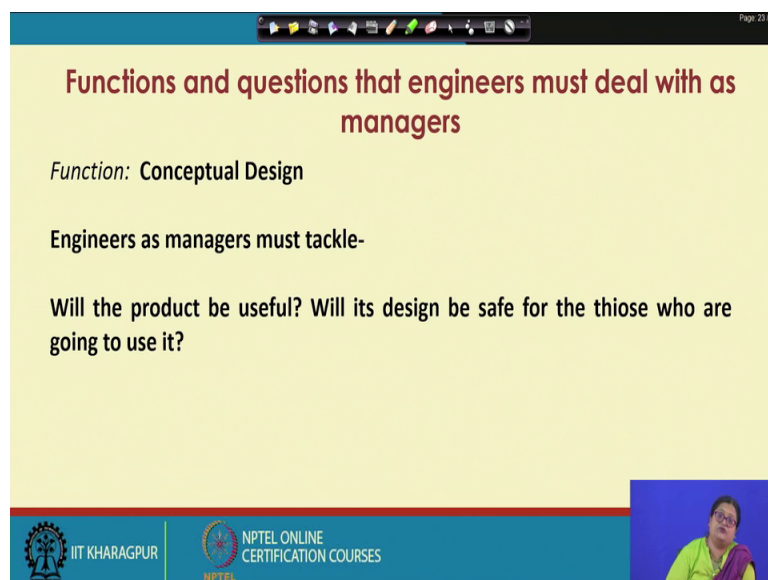
(Archie B. Carroll, "Ethical Leadership: From Moral Manager to Moral Leader," in Rights, Relationships & Responsibilities: Business Ethics and Social Impact Management, Vol. 1, 2003. O. C. Ferrell, Sheb L. True, and Lou E. Pelton (eds.), pp. 7-17)

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So, they have an obsession towards fairness in like justice. So, that nobody, there is no wrong done to anyone. So, their principled decision makers, means, they move by values and guided by values and virtues of life. So, what they do is, moral leaders integrate the ethics wisdom with the management wisdom. So, it is not like what is occurring, but we need to focus on what is morally or ethically correct.

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Functions and questions that engineers must deal with as managers

*Function: Conceptual Design*

Engineers as managers must tackle-

Will the product be useful? Will its design be safe for the those who are going to use it?

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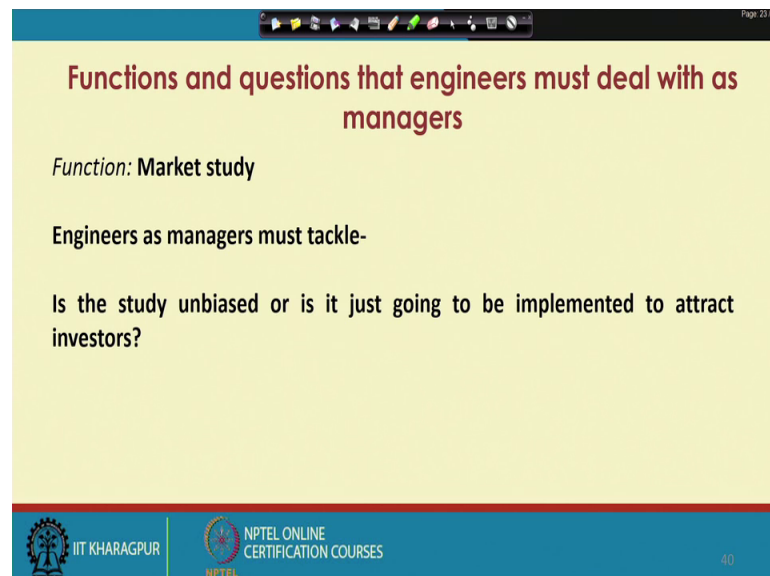
So, we will discuss with some functions and questions that managers must deal with and more so like the engineers managers must deal with in their managerial role. So, one of

the questions functions could be conceptual design and the dilemma question could be like will the product be useful? So, and if it is useful then will the design be safe for those who are going to use it. These are very tricky questions again based on the utility perspective and because we do not know like who will be using it.

So, like will the design be safe for those who are using it? Then it depends on how we are defining, who will be using it how we are defining, who will not be using it by mistake also, so that we understand the end use of the product will always being safe hands. They will follow the processes as discussed. They will not going to mishandle or misuse it. How do we make a guarantee for it or should we incorporate as much as safety as possible in the design? So, that it is like even if it is mishandled the chances of like accidents are reduced.

So, these are certain decisions that the leader manager in terms of like moral leaders need to take. And in a very like they have to broaden the thought process think of all the different alternatives possible of use and misuse of the products and what could be the after effects of that and then they try to incorporate certain check measures in their design.

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**Functions and questions that engineers must deal with as managers**

*Function:* **Market study**

**Engineers as managers must tackle-**

**Is the study unbiased or is it just going to be implemented to attract investors?**

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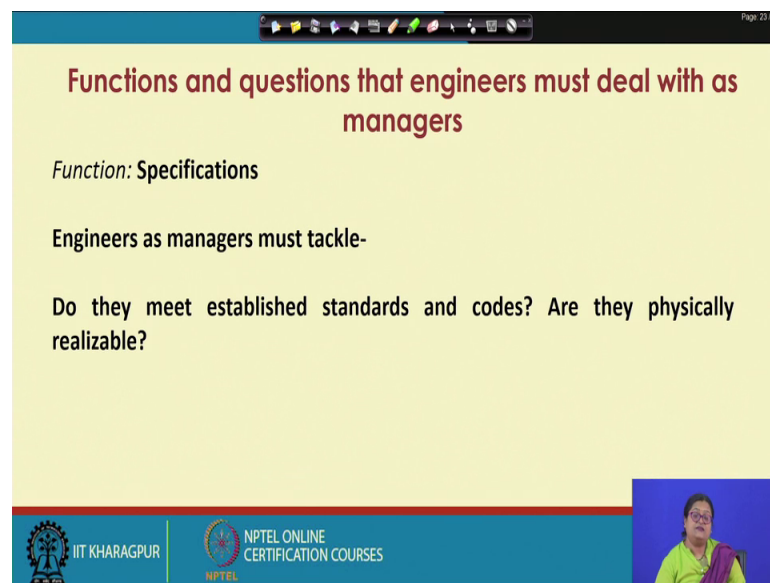
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So, next important function where some questions the engineers as managers may need to tackle is market study. So, like questions like why you are doing this study? Is it to find out the report a true fact or it is a part of a deceptive action, where is whom have

you taken as your sample, for how much long period you have make that observation to come to a conclusion that you are claiming? So, these could be questions that engineers as managers may need to tackle with respect to the function of market study.

So, question measure is like is the study unbiased or it is just going to be implemented for the sake of money to attract investors.

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## Functions and questions that engineers must deal with as managers

*Function: Specifications*

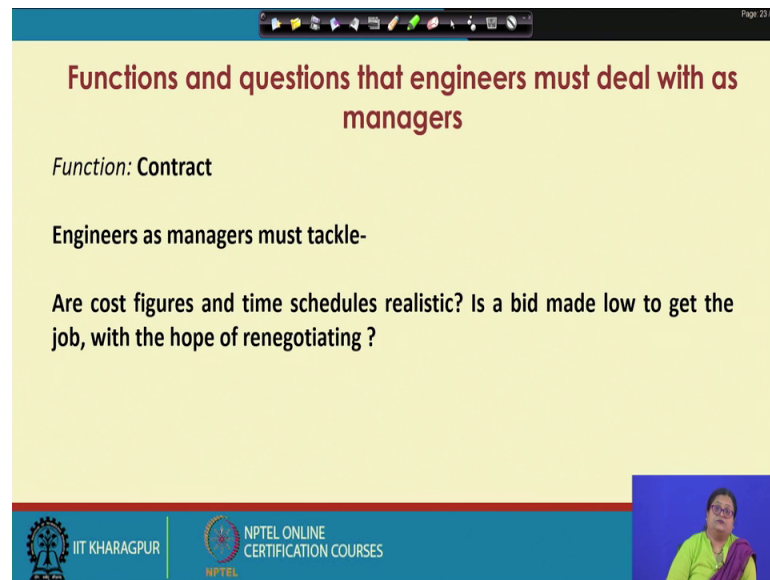
Engineers as managers must tackle-

Do they meet established standards and codes? Are they physically realizable?

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So, next is specifications like, do first we have to understand like whether there any state it is specifications, which is widely accepted for the quality of the product. If yes, then whether the company has produced the like products as per their limiting the standards on codes, and the standards that are written also are it like physically realizable or not or we have set some standards which is very hard to achieve?

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**Functions and questions that engineers must deal with as managers**

*Function: Contract*

Engineers as managers must tackle-

Are cost figures and time schedules realistic? Is a bid made low to get the job, with the hope of renegotiating ?

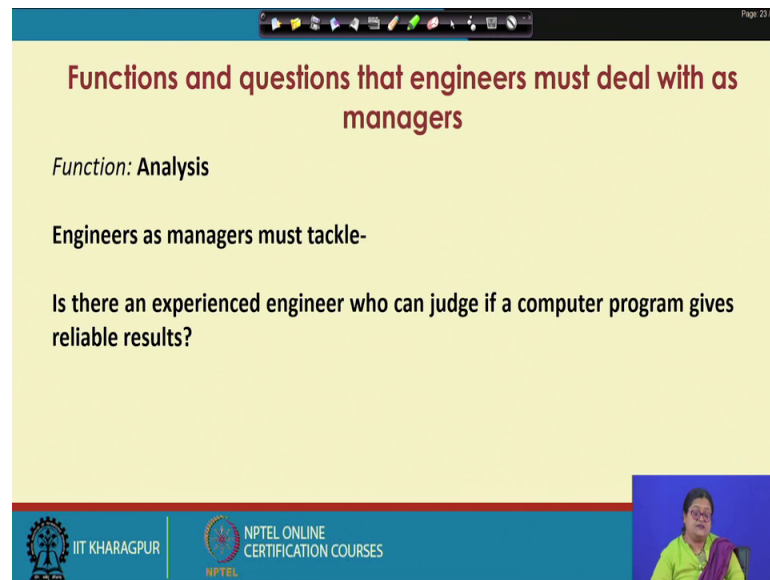
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So, in terms of contracts, there is another functions which is in terms of contracts like questions may come up with realistic to our cost figures and time schedules realistic, then is it a bid which is made low to get the job with the hope of feature negotiating? So, what happens if in a competitive bidding? Sometimes if a person bids very low and the person then the person sometimes get order, but if this low bidding is something which is unrealistic, unachievable something which the company who has who got the contract will not be able to provide for.

And future they may think of renegotiating with the different structure, then what happens? Maybe in the original when the original bidding was going on and who may not have given as much as lowest prices this bidder, may could have given the better like deliverable the quality. But in search for like keeping towards the lowest financial bids, so, we may have missed out on expertise of other organization.

So, like this we have to find out at the cost figures or the time schedules given are realistic or not.

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**Functions and questions that engineers must deal with as managers**

*Function: Analysis*

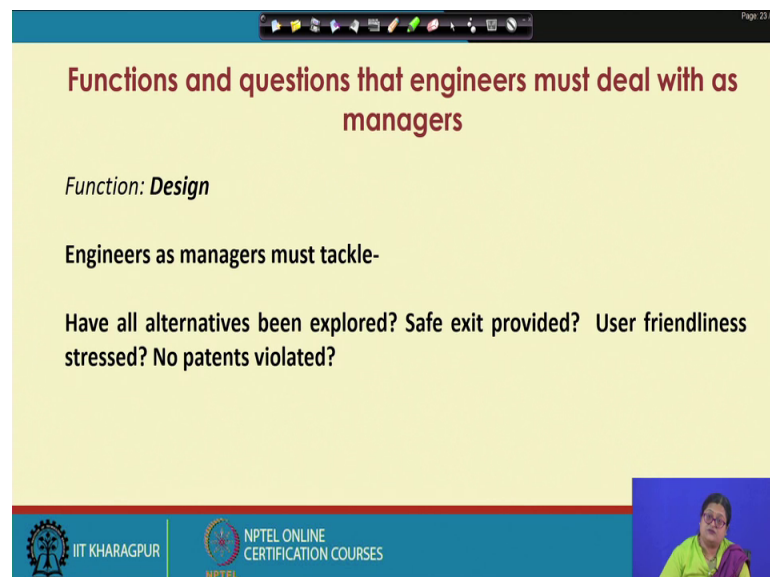
Engineers as managers must tackle-

Is there an experienced engineer who can judge if a computer program gives reliable results?

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In terms of analysis, we have to find out like is there any experienced engineer who can judge a computer program which gives reliable results? Because these are expertized domain and lay person may not always have the correct answer for it. So, it has to be a domain expert you can come up with this knowledge.

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**Functions and questions that engineers must deal with as managers**

*Function: Design*

Engineers as managers must tackle-

Have all alternatives been explored? Safe exit provided? User friendliness stressed? No patents violated?

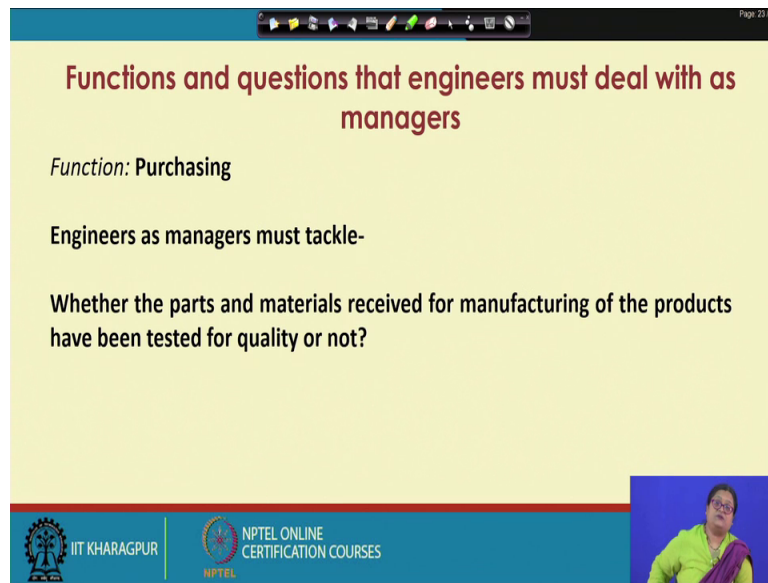
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Next function is design which is a very important function. So and in design where before we come up to the solution which is very important to understand; like, before we come up with any design, which is very important to understand like have all alternatives

being explored or not. If a safe exit is provided or not, then whether it is like user friendliness has been given importance for the design or not?

And where is it like some patents were violated? So, other ways it may be become a legal issue. So, whether all exports have been alternatives have been explored, then exit provided, user friendliness? Then patent violation, these are some important points to take a decision of the design.

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The slide is titled "Functions and questions that engineers must deal with as managers". It lists the function of "Purchasing" and poses a question: "Whether the parts and materials received for manufacturing of the products have been tested for quality or not?". The slide includes logos for IIT KHARAGPUR and NPTEL ONLINE CERTIFICATION COURSES. A small video inset shows a woman in a green shirt.

**Functions and questions that engineers must deal with as managers**

*Function: Purchasing*

**Engineers as managers must tackle-**

**Whether the parts and materials received for manufacturing of the products have been tested for quality or not?**

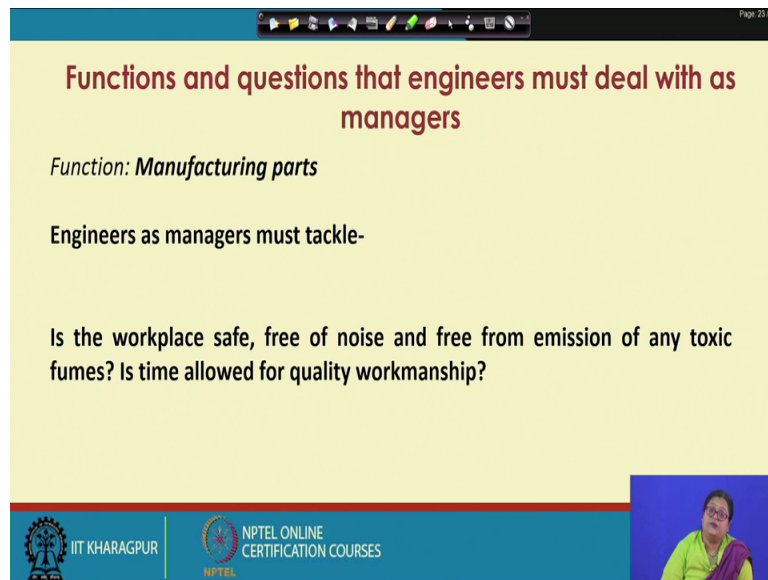
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Next important area is that of you know like purchasing. So, we may get something in a low price, but we cannot like compromise sometimes on a quality. Other aspect is also could be true may be the quality is not so good, but by charging we understand we charging high price they may claim in a (Refer Time: 10:59) way right. They are high priced bit therefore, their quality good.

So, like both things may or may not match. So, to put a check on that, we have to understand whether the parts and materials received from for manufacturing of the products have been tested for quality or not? So, having quality check is very, very important, like, we have to understand like whether this each and every parts and material have been quality tested or not.



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**Functions and questions that engineers must deal with as managers**

*Function: Manufacturing parts*

Engineers as managers must tackle-

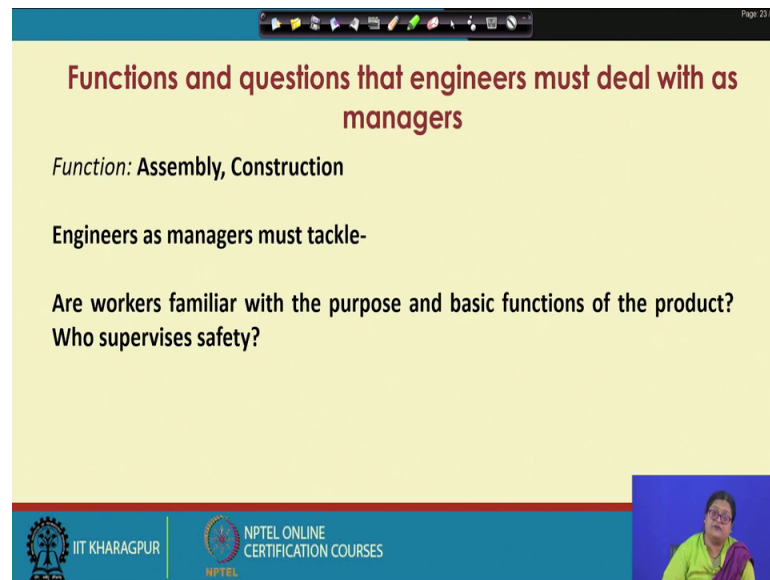
Is the workplace safe, free of noise and free from emission of any toxic fumes? Is time allowed for quality workmanship?

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Another important phase manufacturing parts like it talks of workplace safety, it is free from noise free from emission of toxic fumes. So, it is a time allowed for quality workmanship means, increasing their knowledge base or not? These are important decisions.

So, like whether workplace safety is mentioned, whether there free of noise, then toxic gases are there or not toxic fumes? So, within what time they need to finish a job? Sometimes, it may happen that expectations is so much, but the time given to perform is very less whether they will be able to tackle with those things or not.

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**Functions and questions that engineers must deal with as managers**

*Function: Assembly, Construction*

Engineers as managers must tackle-

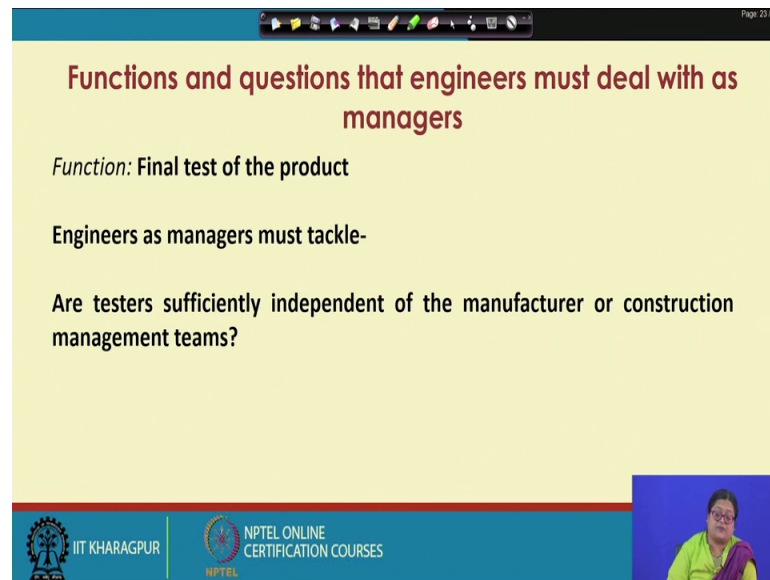
Are workers familiar with the purpose and basic functions of the product?  
Who supervises safety?

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Next we will focus on the area of assembly and construction. So, the question here it is; so, are the workers family or with the purpose or basic functions of the product? Who supervises safety? Because if their familiar with the purpose at basic functions of the product, they may develop a like self-regulated safety measures to handle these things properly.

And also these gives like the worker's familiarity with the purpose and basic functions of the product gives the employee a sense of connectivity and job satisfaction, like complete understanding of the nature of the job meaning of the job. And that may lead to their better contribution because they can see a holistic picture now.

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**Functions and questions that engineers must deal with as managers**

*Function:* Final test of the product

Engineers as managers must tackle-

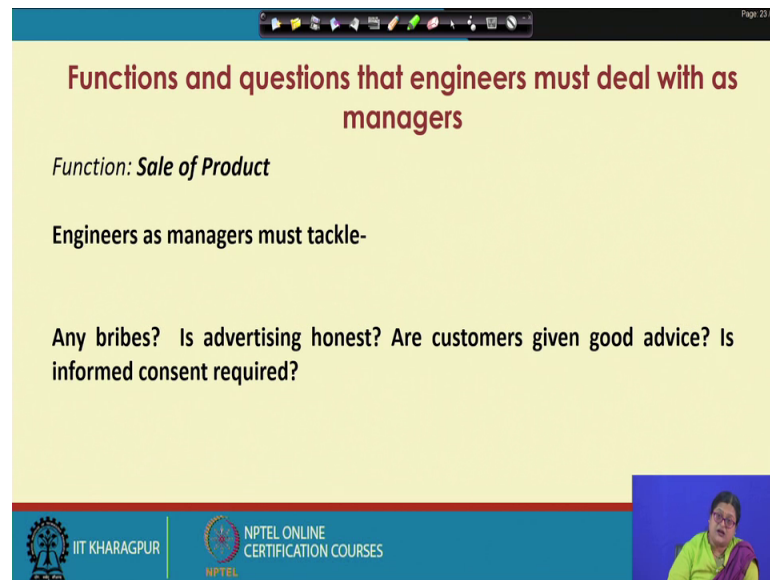
Are testers sufficiently independent of the manufacturer or construction management teams?

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Then comes to the final test of the product; so, because engineers as managers. So, we have to understand that there should not be any conflict of interest. So, testers, manufacturers or construction management teams, they should be independent of each others. So if something comes out in the testing, the testers are like independent enough to tell like this is due to the manufacturer or this is due to the construction management team, but if they included within the team they may be fearful of opening up.

So, we have to ensure as the engineers and managers like they are teachers are sufficiently independent of the manufacture of the construction management team.

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## Functions and questions that engineers must deal with as managers

*Function: Sale of Product*

Engineers as managers must tackle-

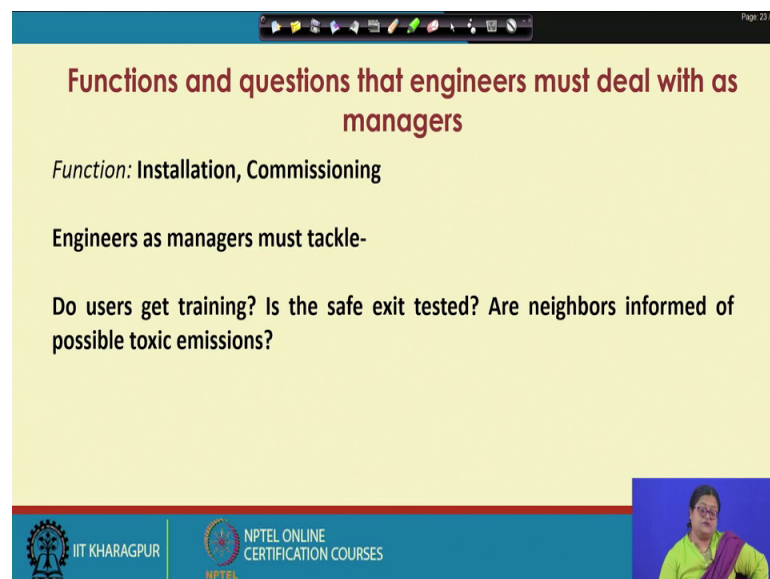
Any bribes? Is advertising honest? Are customers given good advice? Is informed consent required?

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Now, when it comes to the sale of the product, there again certain decisional points that they need to take like, do we pay bribe yes or no, whether the advertisement is honest or not, where the customers are given really good advices? So, like for doing certain testing whether like, informed consent is required and not ad if so how what is the process to get it done? These are certain questions which are like questions of dilemma irrespective of the may be culture religion and time frame. And this we need to remember like, look at in bribes, honest advertising etcetera.

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## Functions and questions that engineers must deal with as managers

*Function: Installation, Commissioning*

Engineers as managers must tackle-

Do users get training? Is the safe exit tested? Are neighbors informed of possible toxic emissions?

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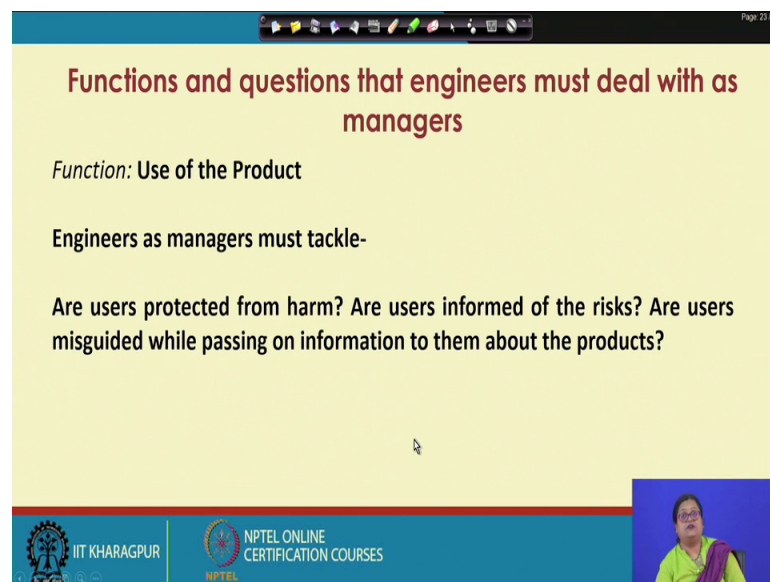


So, like when we again talking of the function of installation and commission, here what happens? Like, after it is got tested, then if you see like after it is got; here we see that after it has got the final testing of the product then it needs to be coming to the market. So, there we come up with the sale of the product.

So, there we find like whether again we have found how do we sale it like any bribes are given; an honest advertisement is given informed consent is required yes or no? So, these are connected to that. And after that when it is installation or commission after your sale, you have to go to the site to install it. So, there the questions which needs to be tackled is to the users get enough trainings.

So, if there is an safe exit, so, whether people are neighbors are informed of possible toxic emotions? Otherwise, we just cannot go and install something in society, there are others stakeholders involved also, which may or may not agree to we doing certain things and terms of like in installation commissioning of the products or services so, or for a project. So, we have to understand like whether they get trainings, so the users get training of how to use it, is there a safe exit and neighbors are well informed ahead?

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**Functions and questions that engineers must deal with as managers**

*Function: Use of the Product*

**Engineers as managers must tackle-**

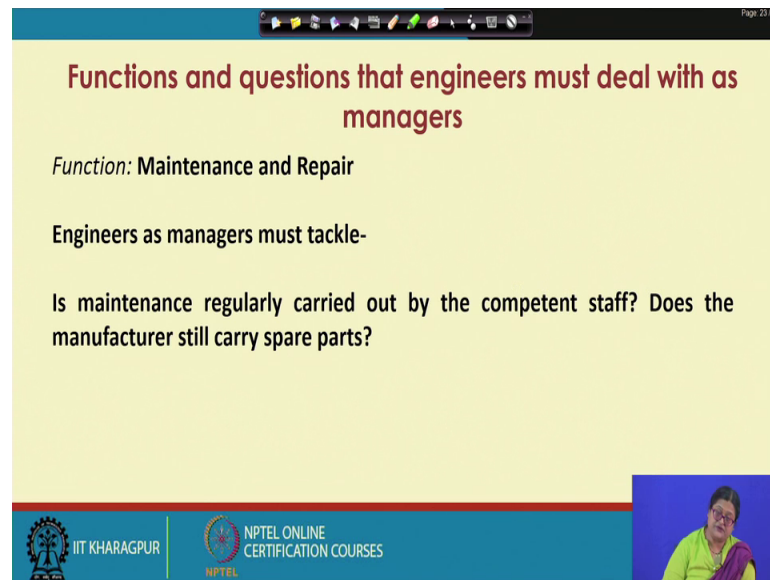
**Are users protected from harm? Are users informed of the risks? Are users misguided while passing on information to them about the products?**

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After installation is done, the function which is there is the use of the product. Again also we need to cross check like whether users are protected from the harm. So, then, do users know the risk involvement in it? So, when the users get misguided while sometimes information at passed out to them and te they are not able to take a rational judgment. So,

that is why it is part of the responsibility to find out like the are they users protected from harm? So, do they know the amount of risk properly? And more so like, whether they have taken a conscious decision of using the product.

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**Functions and questions that engineers must deal with as managers**

*Function: Maintenance and Repair*

Engineers as managers must tackle-

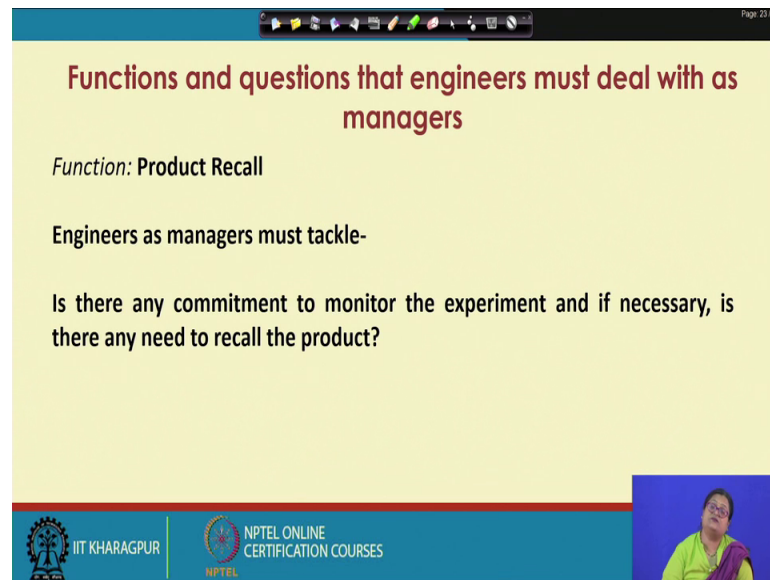
Is maintenance regularly carried out by the competent staff? Does the manufacturer still carry spare parts?

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Next after we have used it, we are just going serially step by step defined after been using it next questions comes that of maintenance and repair. So, there are the possible questions could be like are maintenance regularly carried away by competent staff then do the manufacturers still carry spare parts or no or like, with changing sometimes if I like it is everything in use and throw?

May be it is not possible, so, whether there are regular people who can take care of this faults and then try to maintain it, try to see the products of maintenance, original conditions and repair for the faults, do they carries spare parts with them which shows like the maintenance culture is there? These are very important questions to be handled.

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**Functions and questions that engineers must deal with as managers**

*Function: Product Recall*

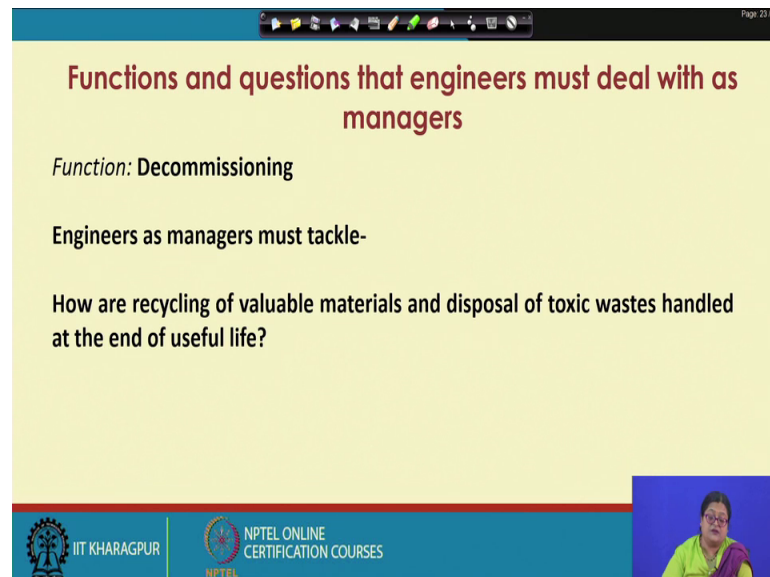
Engineers as managers must tackle-

Is there any commitment to monitor the experiment and if necessary, is there any need to recall the product?

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Next function which is important from the perspective of the organization is recall. So, if there is any commitment to monitor the experiment and if necessary is there a need to recall the product? This is again a self-search. The company should check to find out like whether everything is going in a correct way or they need to recall the product?

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**Functions and questions that engineers must deal with as managers**

*Function: Decommissioning*

Engineers as managers must tackle-

How are recycling of valuable materials and disposal of toxic wastes handled at the end of useful life?

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And when you are talking about decommissioning, so, these are again questions of recycling the valuable materials and disposal of toxic wastes handled at the end of the useful life, where do we do it, what we do with the toxic wastes? So, their valuable

materials how do we dispose it and at the end of the useful life so that the environment does not get polluted? This we need to understand the environment should not get polluted as a part of this recycling and disposal.

So, again for that, we discussed about the maintenance again comes to be a very important thing. So, maintenance, repair, disposal so, what we find throughout the chain, the whole chain of the products life cycle, starting from it is design phase to its may be the material procurement, then getting it designed, then may be installing it, then before that doing a market survey, then installing it, then having a cross check about the use of the product, taking care of the maintenance part of it, then again de installation decommissioning.

So that it is again getting if any like bi products are there, the use of those in an environment friendly way. So, that the it is less of harm produced and quality is maintained at each of this. Safety is assured at each of this steps we have taken care of the long term effect impact of these things.

So, there will be dilemma. There will be sometimes shortcuts available. There could be like requirements of may be vigorous testing and retesting even how you do the testing. So, there could be 2 3 parts; one which is easy, one which is short cut, one which you may give you immediate result, another one which is serious, which may painful, which may require long hours of testing, which may require revisiting whatever you have done time in again to find out, whether things are working properly or not?

And where the like maintaining safety, whether look into the health issues or not? Of not only a present generation, but future generation which is may be a time consuming process, and the leader as a moral leader, now may need to choose between these alternatives taking into my the safety aspect the health aspect of the population at large and for the long term sustainability and also taking the environmental issues into consideration, so that we are not going to provide harm to the environment. So, there the way that you make your decision, so, if you are acting like a moral leader, it helps you to make correct decision.

Thank you.