Management of Inventory Systems
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Lecture - 53
Value Engineering / Analysis and Stores Management (Contd.)

So, during the session, this is a 3rd session of the week I will be referring to a particular case study on value engineering or value analysis you might say, and what are you intend to do? Actually I intend to say the discuss in detail all the activities which we have carried out for a value engineering or value analysis project in a manufacturing company.

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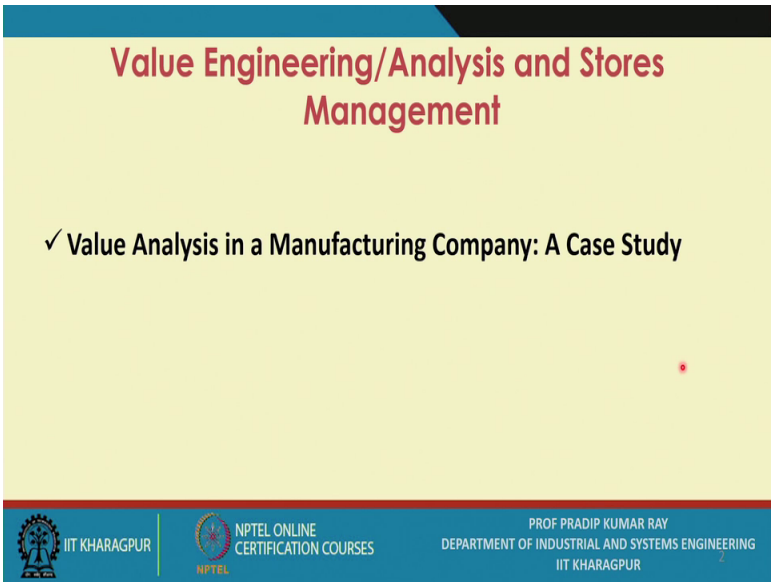

And main objective is so, if you go through the details of this case study, you will come to know that how a particular value engineering the study is to be conducted. What are the possible problems you may come across? What sort of the detailed information particularly the design related data you must have and how to implement the project.

So, that ultimately the company the gets the real benefit out of this project value engineering project. So, the next half an hour or so I will be discussing this particular case study and essentially is a case study on value analysis in a manufacturing company.

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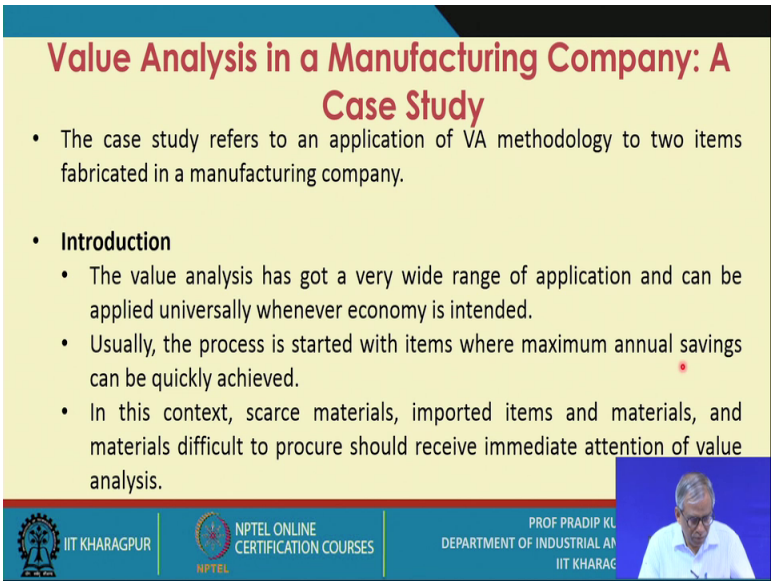

Now, the case study refers to an application of VA methodology; that means, it is for the existing product, that is why we are we are saying the this is a value analysis exercise or value analysis methodology. And this case study refers to 2 items, fabricated in a manufacturing company. And these 2 items we have selected for the for the same product.

And essentially you know will be referring to the manufacturing system. And what we have explored at that if you apply the value engineering say the methodology the generic framework or generic approach, then a in the manufacturing process itself there could be maybe lot of there could be lot of cost reduction, and the entire say the production cost.

So, the value analysis has got a very wide range of application. And can be applied universally whenever economy is intended for many reasons we will find that that value engineering at the design stage in many cases this may not be adopted due to many other reasons.

But value analysis has been in use for quite some time for many many organizations. Usually the process is started with items where maximum annual savings can be quickly achieved. Like, I have already mentioned the return on investment. Now, in this contexts scares materials imported items and materials.

Many of our the manufacturing systems, they have the scares materials they have to use case materials they have to used, imported items and materials, and materials difficult to procure, should receive immediate attention of value analysis.

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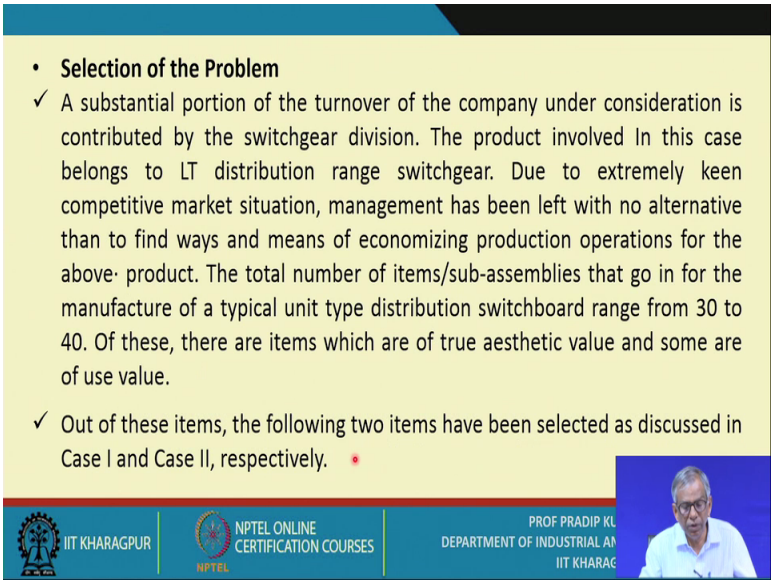

Like if you go for so, the inventory classifications so, one inventory classifications we have if you the remember, that is SDE analysis. So, in SDE analysis what you do? You try to identify you know the scares are mostly imported items in one group they referred to as s items. And in the next category you have the d item, d means difficult to procure, and e stands for easy to procure. So, obviously you know you concentrate on say the scare materials or the or the scares items as well as the difficult to procure items for value analysis.

So, how do you select the problem? Now, here let me just mention all the details, a substantial portion how the turnover of the company sales turnover of the company under consideration is contributed by the switchgear division. The product involved in this case belongs to LT distribution range switchgear.

Due to extremely keen competitive market situation, management has been left with no alternative that to find ways and means of economizing production operations for the above product; that means, here we are concentrating on the production or production systems or say the on the different processes on operations for the product under

consideration. The total number of items or sub-assemblies that go in for the manufacture of a typical unit type distribution switch board, range from 30 to 40.

So, your distribution switch board is your product which consist of 30 to 40, depending on which model you prepare a which model you use. Of this there are items which are the true aesthetic value. Aesthetic value means essentially it is an appearance value, and someone of use value or the functional value. Out of these items the following 2 items have been selected as discussed in case 1 and case 2 respectively.

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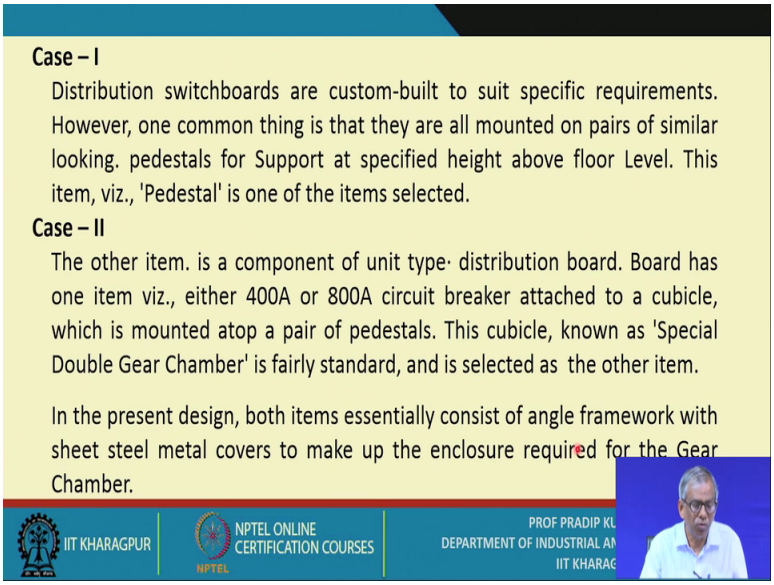

That means what we have selected out of all these items we have selected one item, that and on that I first item, and then on that you apply the value analysis methodology. And similarly we select the second item, and again for the second item we have applied the value analysis methodology.

So, essentially we are referring to 2 cases, case 1 and case 2. So, what is case 1? Distribution switch boards are custom built to suit specific requirements; however, one common thing is that they are all mounted on pairs of similar looking pedestals for support at specified height above floor level, is it ok? That is the support, this item mainly the pedestal is one of the item selected.

So, the pedestal is the first item, and the second item is the other item is a component of unit type distribution board. Board has one item either 400 ampere or 800 ampere type

circuit breaker attached to a cubicle; which is mounted atop a pair of pedestals. This is a typical you know the systems they have.

This cubicle known as special double gear chamber is a fairly standard and is selected as the other item. So, the first item is the pedestal and the second item is a special double gear chamber. Now in the present design, both items essentially consist of angle framework. There is a fabricated item with sheet steel metal covers to make up the enclosure required for the gear chamber.

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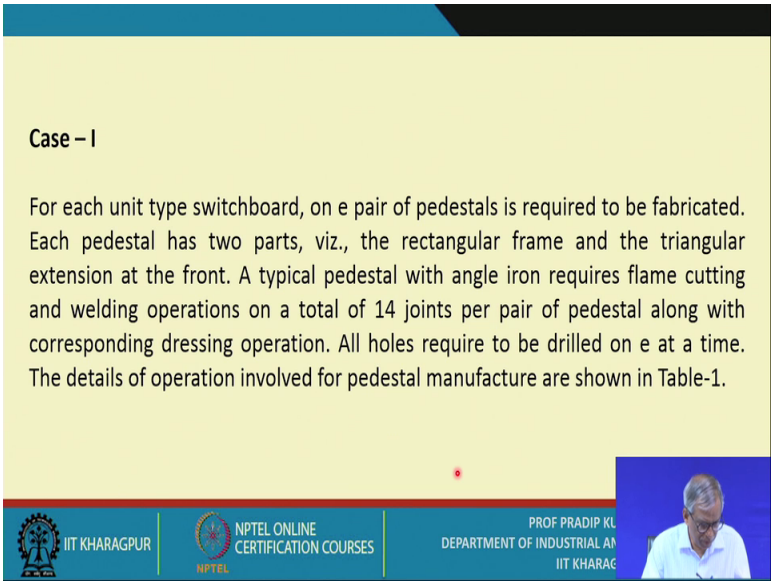

So, these details go through, I will refer to case 1 for each unit type switch board on a one pair of pedestals is required to be fabricated. Each pedestal has 2 parts namely the rectangular frame and the triangular extensions at the front. A typical pedestal with angle iron requires flame cutting and welding operations; that means you are becoming aware of other kind of operations you required for the fabrication. And you require you know the frame cutting and welding operations on the total of 14 joints part pair of pedestal along with corresponding dressing operation.

So, obviously, there will be some dressing operation finishing operations that you do, all holes required to be drilled on say. So, the pair as a pedestals at a time. The details of operations involved for pedestal manufacture I am just showing it in the stable.

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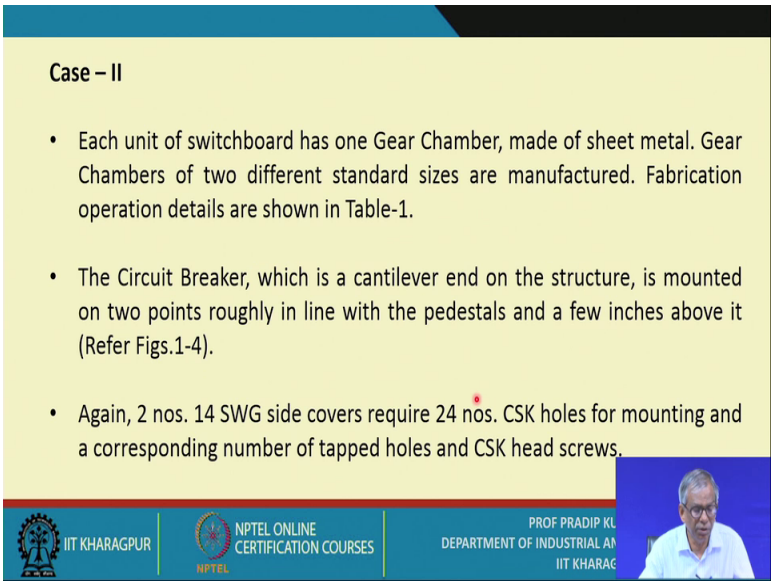

So, we will we will referring to the table, you will come to know what are the operations you carry out. And now after we refer to the case 2 right in case 2 each unit of switch board as one gear chamber.

So, these details you must have made of sheet metal. Gear chambers of 2 different standard sizes are manufactured, and this the fabrication operation details are also shown in table one. The circuit breaker which is a cantilever end on the structure is mounted on 2 points roughly in line with the pedestals and a few inches above it. So, I will be showing you the exact the figure, and the how the circuit breaker is loaded or is mounted. And 2 numbers of 14 SWT standard wire gauge side covers the required 14 numbers of countersunk holes for mounting and corresponding number of tapped holes and the countersunk head screws.

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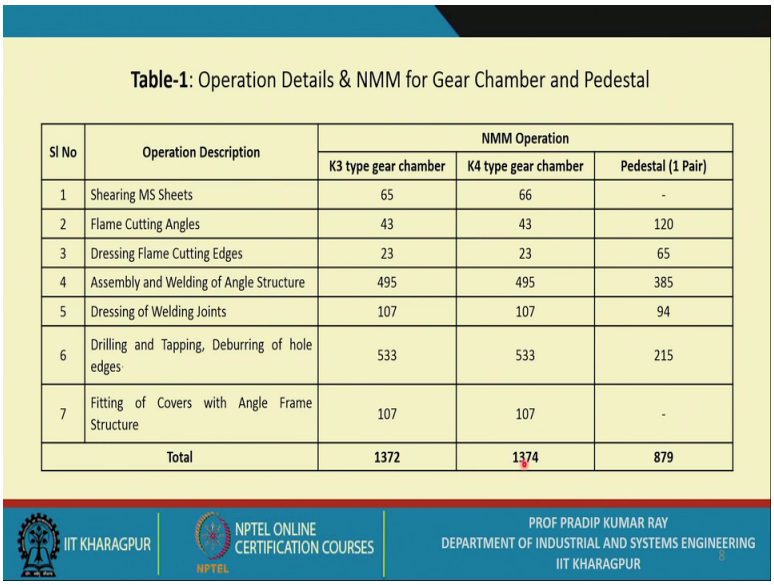

Sl No	Operation Description	NMM Operation		
		K3 type gear chamber	K4 type gear chamber	Pedestal (1 Pair)
1	Shearing MS Sheets	65	66	-
2	Flame Cutting Angles	43	43	120
3	Dressing Flame Cutting Edges	23	23	65
4	Assembly and Welding of Angle Structure	495	495	385
5	Dressing of Welding Joints	107	107	94
6	Drilling and Tapping, Deburring of hole edges	533	533	215
7	Fitting of Covers with Angle Frame Structure	107	107	-
Total		1372	1374	879

Now, this is the table where you will find that all the operations are mentioned operation details are given, just you just a go through all these operations. And this is one type of gear chamber, and this is the second type of gear chamber. There some you know this is not substantial changes as far as you know the normal man minute is concerned the operations. And these are the values of so, the normal in normal man minutes against each operation. And this is these are the operations you carry out for fabricating the pedestal.

So, 1-pair pedestal you make you fabricate whether. So, this is the total, you know say the normal man minutes. This is 1372, the next one is 1374. There is so almost same, and for the pedestal 1-pair pedestal it is 879.

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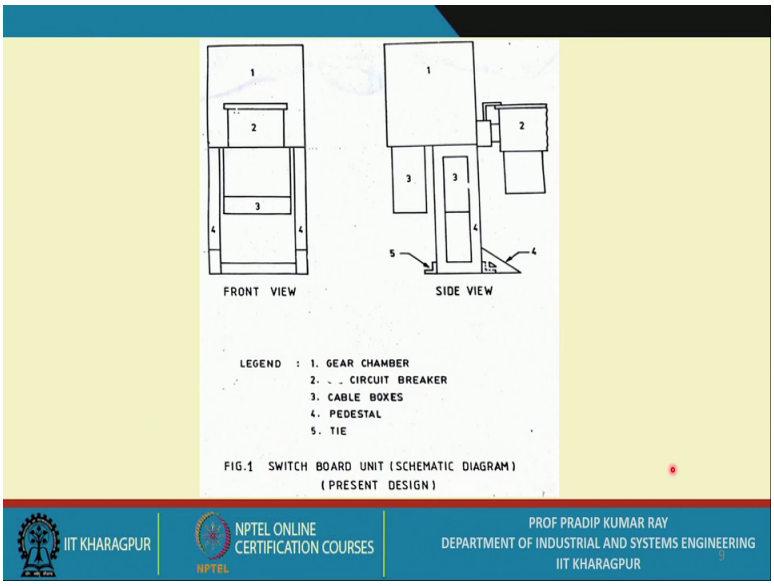

So, this is the schematic diagram of the structure. So, this is the front view, and this is your side view. So, you have the gear chamber, this is the gear chamber, these are the circuit breakers, these are the circuit breakers. These number 3 is the cable boxes, and number 4 is your pedestal, and the 5 is essentially the time. So, this is a schematic of the presentation of the entire the fabricated body, and as per as gear chamber is concerned this the drawing you have with covers removed.

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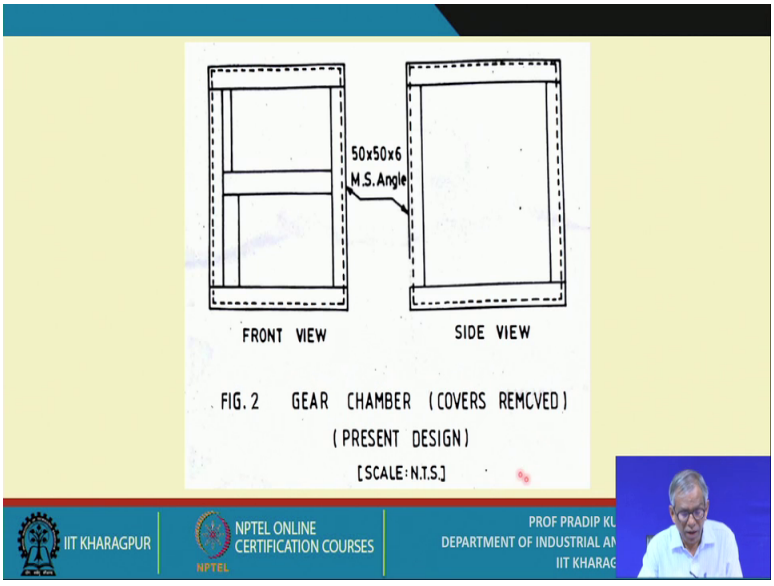

So, this is the present design, is it ok? But this is drawn not to scale.

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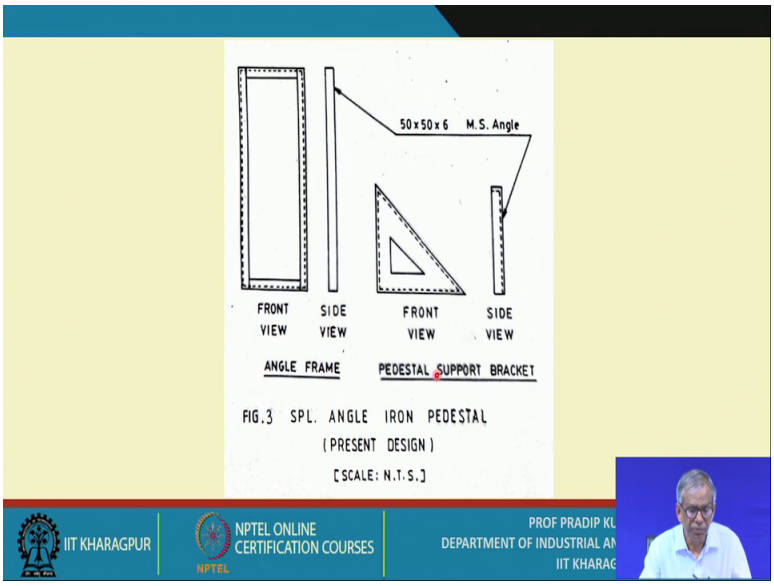

And then this is the special angle iron pedestal, when you refer to the present designed. So, first you refer to the present design, get the details. So, this is the front view, this is the side view, this is the angle frame. And for the pedestal support bracket, you have these the front view and this is the side view. And this is the mile steel angle that is 50 by 50 into 6. So, all these detail informations you have.

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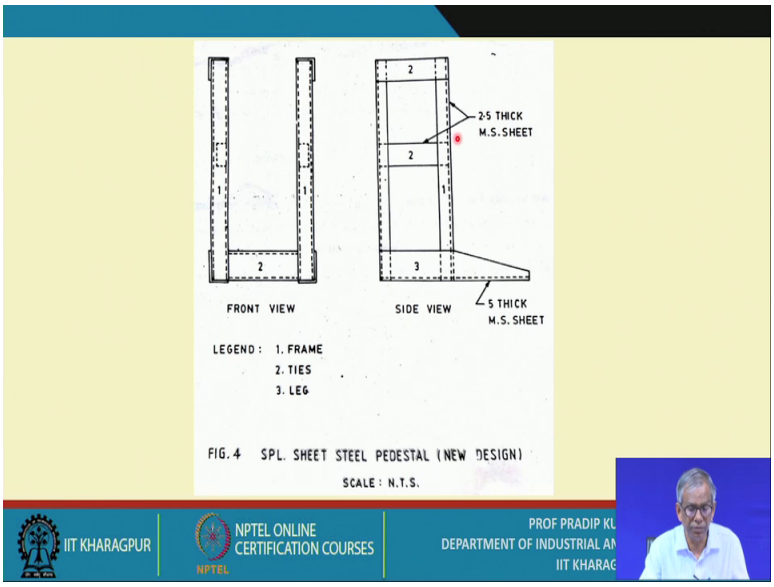

And then when you referred to the new design, we are proposing a new design; that means, the special sheet steel pedestal we are proposing ah; that means, in the new design. So, this is your the front view, this is your side view.

So, what you have you over here? The number 1 this is the 2 frames we have over here. This is the frames, and the 2 number 2 is are the ties you have 2, 2 this 2 ties you have and 3 is basically the leg. So, which is directly you know you can see if you look at the side view. So, this is as per the new design. So, we have studied the existing design, and then we try to convert it into a fabrication with so, with sheets say sheet steel are the sheet metal.

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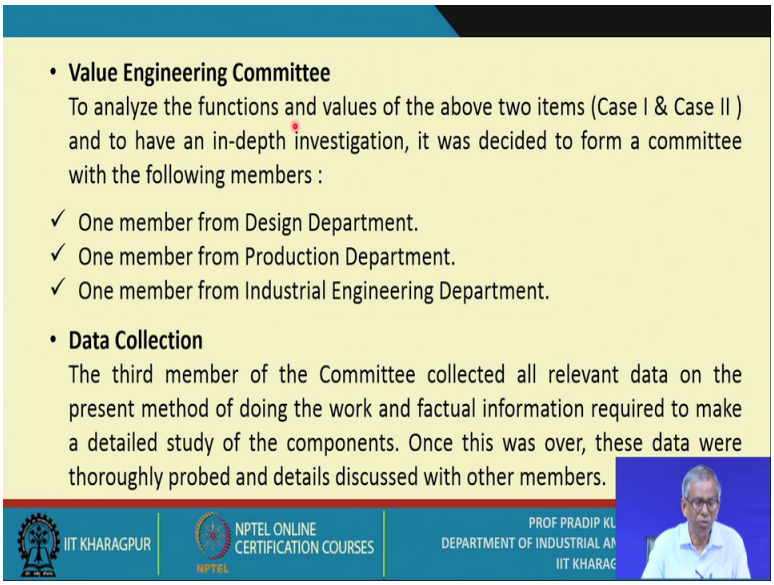

So, that is why is the sheet steel pedestal we start calling it. Now, we found the value engineering committee. To analyze the functions and the values of the above 2 items one so, case 1 and case 2. And to have an in depth investigation it was decided to form a committee with the following members; that means, I have already mentioned that a committee or the team is to be found, and here is the 3-member team.

So, one member from the design department, the second member from the production department And the third member from the industrial engineering department. So now, we refer to the data collection, the third member of the committee collected all the relevant data; that means, essentially the industrial engineer who was involved.

So, he collected all these relevant data on the present method of doing the work, and the factual information required to make a detailed study of the components. So, like the information on the design. And so, obviously, we have to refer to the drawings. Once this was over, these data where thoroughly probed and details discussed with the other members. So, that you know the data which you have collected, that is found to be the relevant as well as their accurate and this data reliable.

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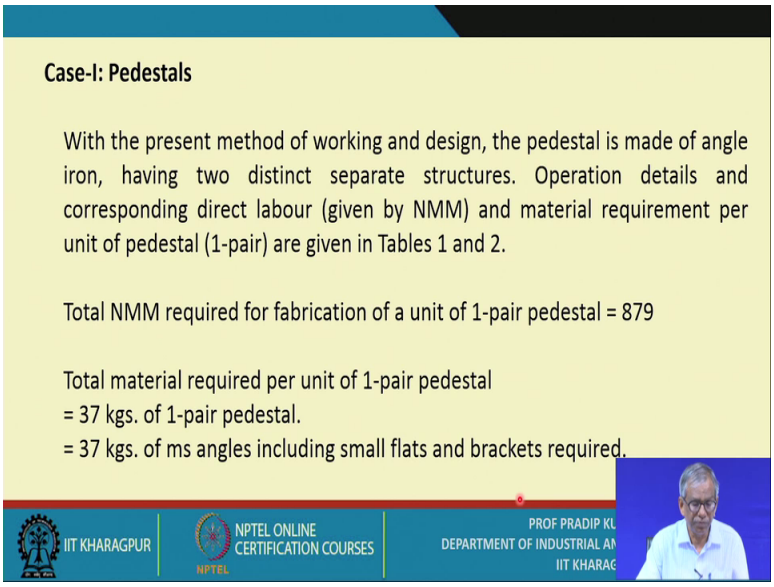

Now, when we refer to the pedestals, with the present method of working and design. The pedestal is made of angle around having 2 distinct separate structures. If you refer to the drawing you will get this details. Operation details and the corresponding direct labour given in normal man minute. And material requirements per unit of pedestal are given in tables 1 and 2.

So, total NMM required for fabrication of a unit of 1-pair pedestal is 879. Already we have referred to this particular table. So, the total material required per unit of 1-pair in pedestal is 13, 37 kg of one pair pedestal, and 37 kg of MS angles including small flats and the brackets required.

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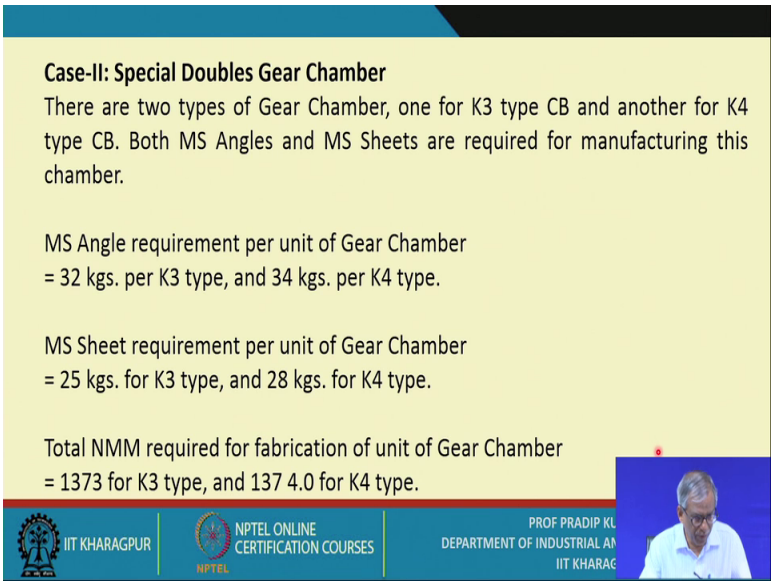

So, this is your materials requirement, and with referred with reference to the special double gear chamber we have the 2 types of gear chamber. One for K3 type you know circuit breaker, and another for K4 type circuit breaker. Both MS angles and MS sheets are required for manufacturing this chamber.

So, when you study is designed, you will get these details. MS angle requirements we have we have estimated, that is 32 kg per K3 type, and 34 kg per K4 type. MS sheet requirements per unit of gear chamber that is 25 kg for K3 type and 28 kg for K4 type. And total the normal man minutes required for fabrication of one unit of gear chamber. That is 1373 for K3 type, and 1374 for K4 type.

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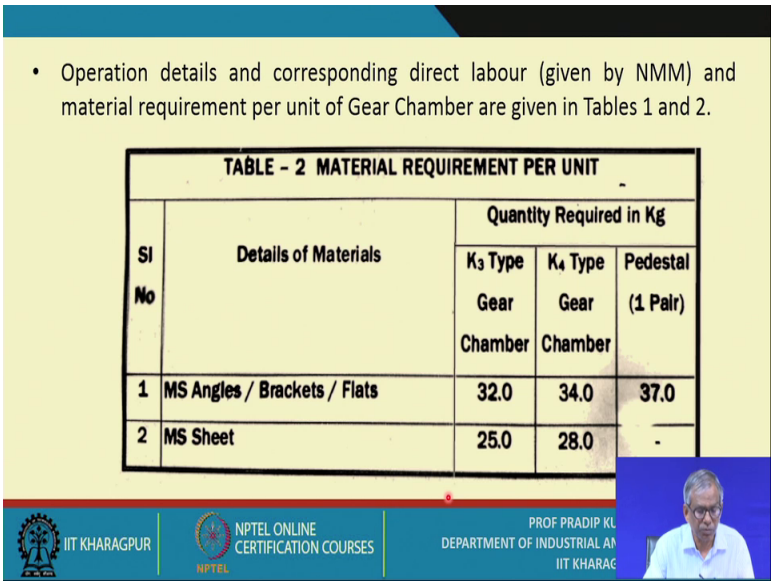

So, the operation details and the corresponding direct labour given by NMM. So, you just refers to this table; that means, material requirements per unit they should be separately estimated. So, you have MS angles or the brackets of the flats. So, the all these details are here; that means, how much so, what is the quantity requirement. And for MS sheets what is the quantity? How much quantity you require?

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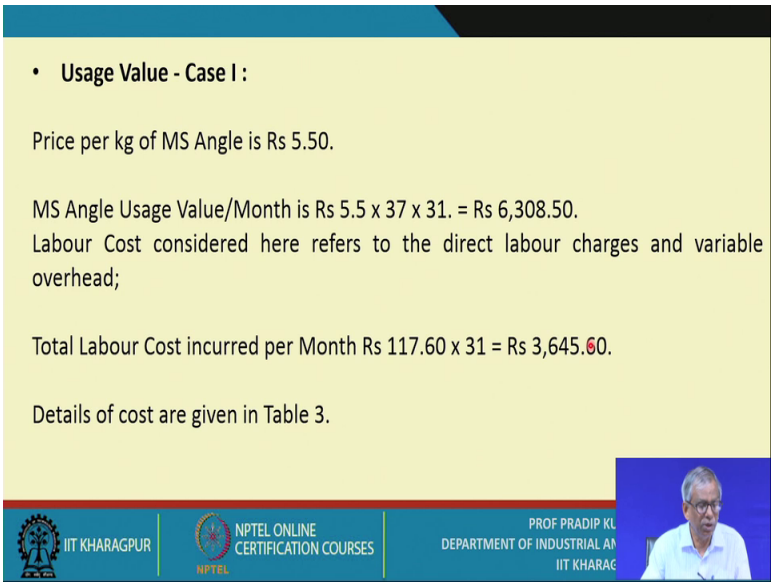

So, you have all this one. Now, we refer to the usage value with reference to the pedestal. So, this way you calculate, we must know what is the price per kg. And MS angle usage

value per month. So, that also you compute. The labour cost considered here refers to the direct labour charges and the variable overhead, is it ok? So, this we are found to be we relevant in this particular case. So, we have to very very careful in identifying are the relevant cost element.

So, this point is to be noted. The total labour cost incurred per month is this amount, this is the one this is just a representative value the details of cost are given in table so, these details are here.

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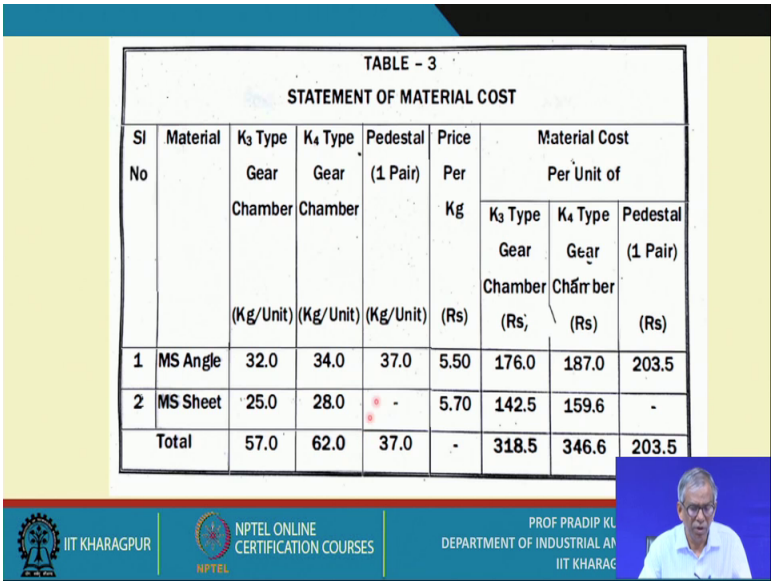

So, my suggestion is you please go through all these details. It is self-explanatory and, but you will come to know that to what extent the detailing is required, is it?

So, are the table 3 actually it is basically a statement of the material cost. So, all these details are here.

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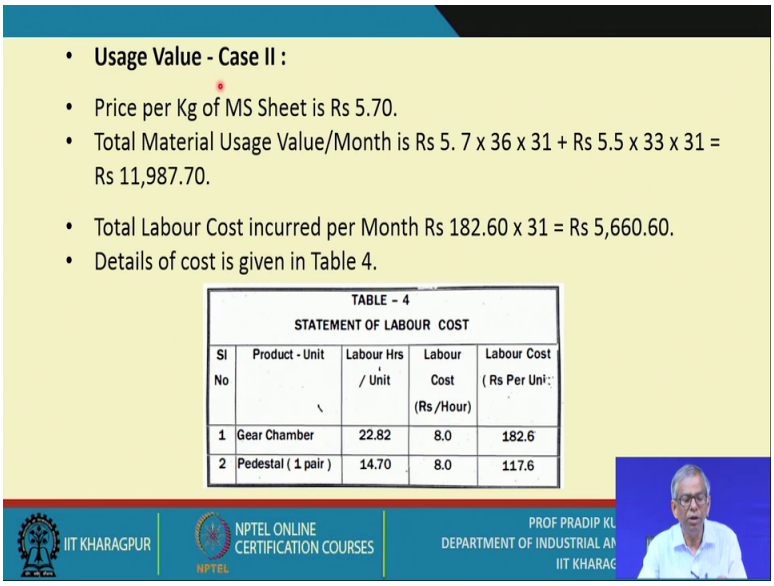

And then when you referred to the usage value for say the gear chamber, that is the so, the case 2. So, again you take this data; that means; the price per kg of MS sheet. Then the total material usage value per month is so, deterministic case. So, usually for any just make a note that for value engineering so, the case studies or value engineering exercise, usually we prefer are the deterministic model. And the total labour cost incurred per month is this much, and the details of the cost is given in this table.

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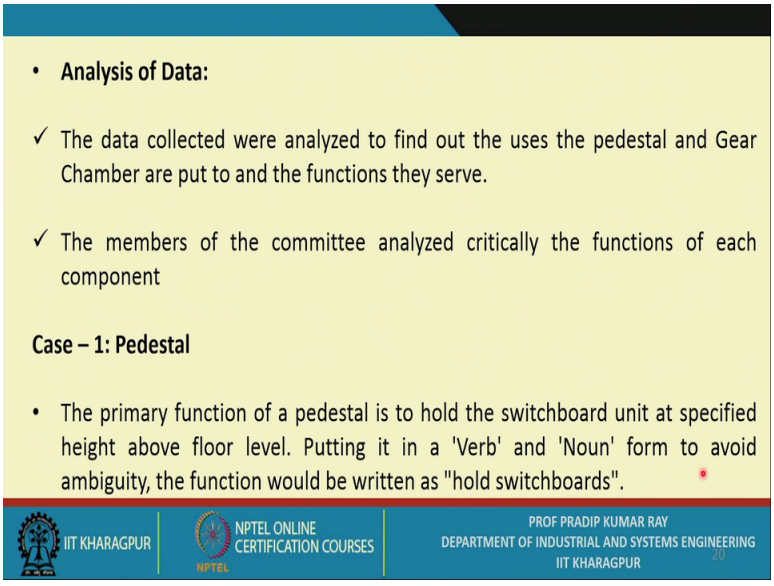

So, statement of the labour cost the referring to say you know which is the part of the usage value and that is case 2. Now, how do you analyze the data? The data collected where analyze to find out the users the pedestal and the gear chamber are put 2 and the functions they serve so, this is very, very important.

So, the that means, what are the data are you get directly from the use value or the functional value. And so, that is very, very important in fact. And the members of the committee analyze critically the functions of each component. So, as far as pedestal is concerned the primary function of a pedestal is to hold the switch board unit at specified height above the floor level. Putting it in a verb and noun form that you have to do as I have already pointed out in the in the previous the lecture season.

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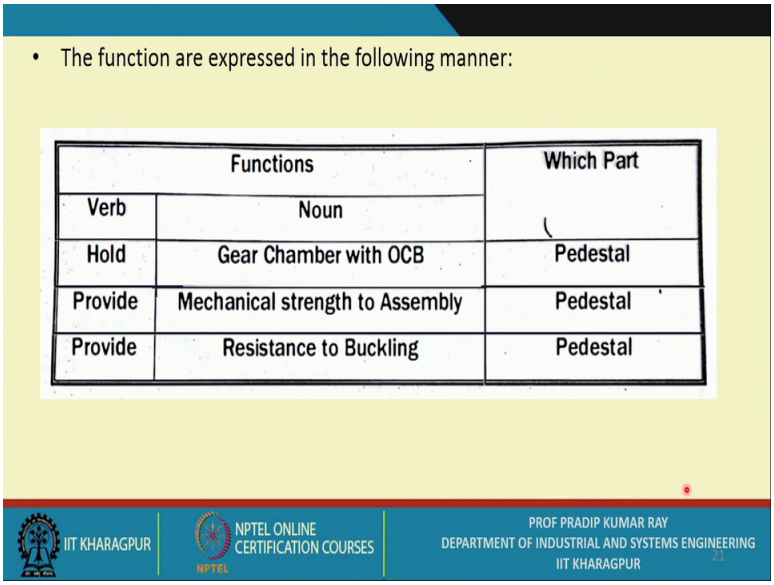

So now, if you put it in a verb and noun form to avoid ambiguity the function would be written as hold switch boards. So, now the functions are described in terms of the verb and noun. So, the verb means hold provide, provide. And the noun is you know the hold gear chamber with circuit breakers, provide mechanical strength to assembly, provide resistance to buckling.

And which part you need to the select you need to identify? Which part actually you need to use for getting this functions? So, in for all this you know are the functions you need to use the pedestal.

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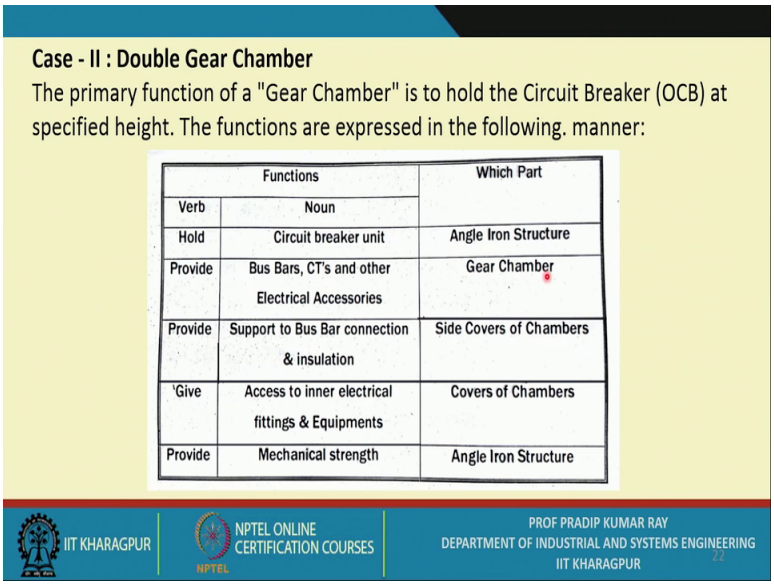

As far as the double gear chamber is concerned; the primary function of a gear chamber is to hold the circuit breaker. You have the you need to identify the primary function, then you move to the secondary function, and then if required you identify the tertiary function.

So, here the primary function is to hold the circuit breaker at specified height. The functions are expressed in the following manner, again will be using the verb and noun, hold provide, provide give, provide; that means, and the noun and when you were joined verb with the noun, you get a total the sentence like hold circuit breaker unit.

Which part angle iron structure that you have to identify? Then provide bus bars CT's and other electrical accessories; that is, basically done by the gear chamber. Provide support to bus bar connection and insulation side covers of the chambers. Give access to inner electrical fittings and equipment covers of the chambers, and the provide mechanical strength; obviously, it is given by the angle iron structure.

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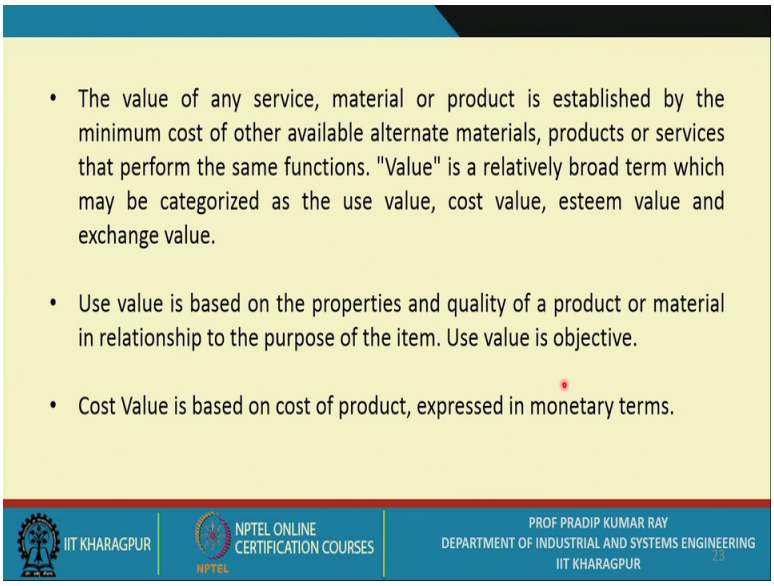

So, this way you present the details of the functions. The value of any service material product is established by the minimum cost of other available alternative materials production services that perform the same function. So now, these aspects is also known to you so, use value is based on the properties and quality of a product or material in relationship to the purpose of the item. This point already we have elaborated. So, the different ways a same concept we are trying to explain. So, the use value is your objective, and the cost value is based on cost of product expressed in monetary terms.

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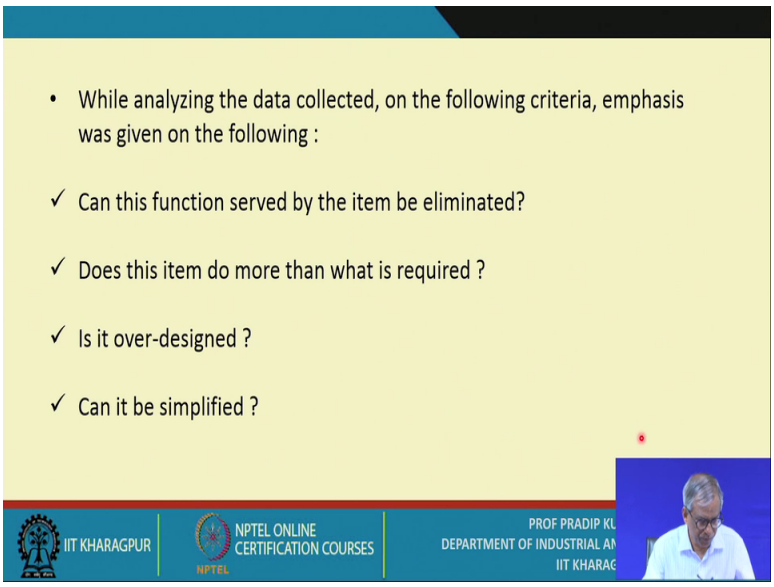

So, while analyzing the data collected on the following criteria emphasis was given on the following; that means, these questions are asked, like the first question one important question you must ask along with the other questions that is it over designed, or is it under designed, can it be simplified?

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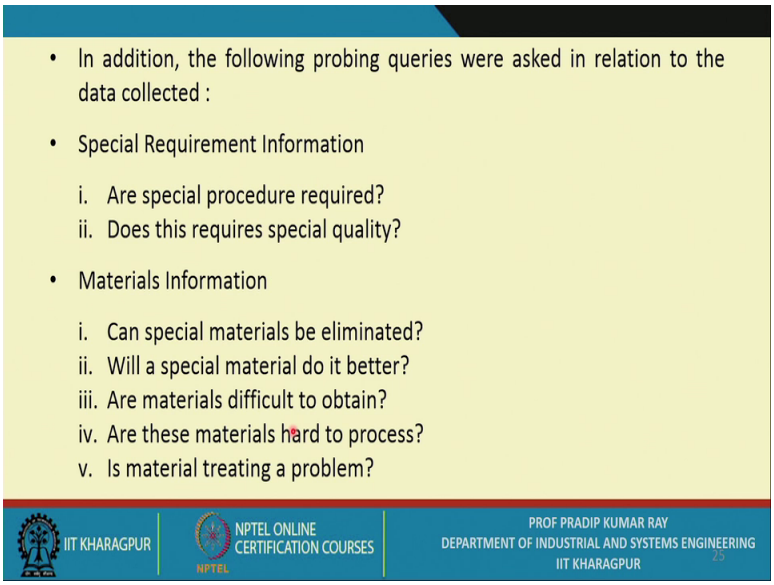

Many cases you may find that it is over designed. So, you are the first purpose would be can it be you know can then alternative design be offered.

So, several other you know the queries you raise are related to the special requirements information like are special procedure required. So, you just go through all these queries, you get the details, it is a detailed you know say that the list of other questions, this is the special requirement, and the these are the 2 questions you must ask, related to materials you must ask this 5 question. So, please go through them.

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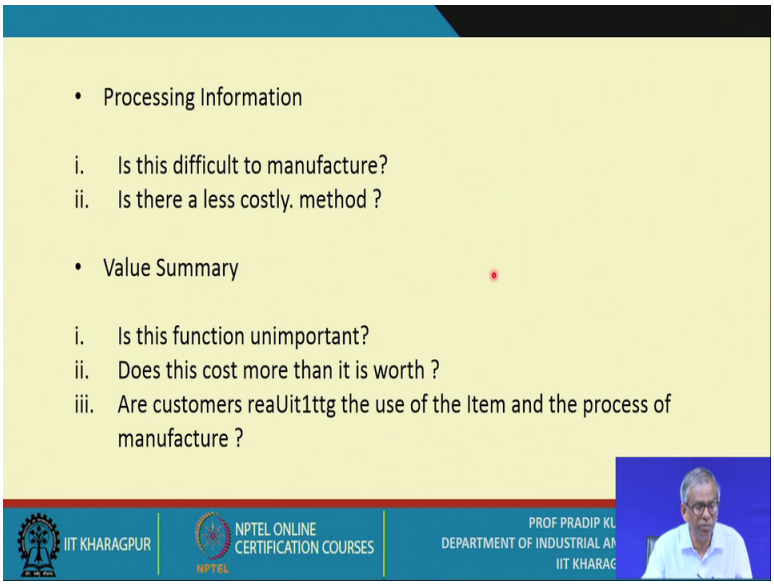

Processing information is this difficult to manufacture? Is there a less costly method? And then you go for the value summary, is this function unimportant? You explore all source of possibilities. Does this cost more than it is worth? Are customers really utilizing the or realizing the use of the item and the process of manufacture?

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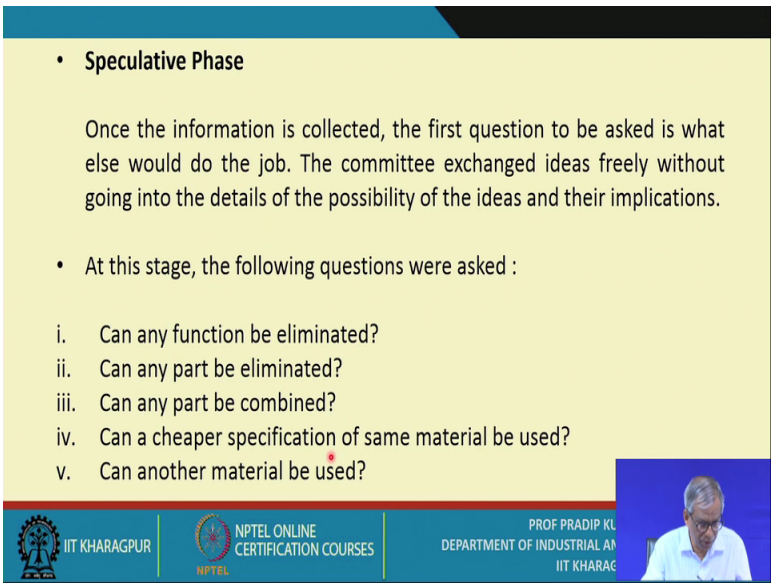

So, all these details then giving the speculative phase again are the following questions are ask just some of the questions of I just you know considered very, very important; like, can any function be eliminated? Can any part be eliminated? Can any part be

combined? That means, when you refer to design improvement the 100 ways are different ways you can go for design improvement. So, these are the typical questions we ask.

And particularly when the product actually you are referring to is nothing but an assembly. So, can a cheaper specification of the same material be used? And can another material be used?

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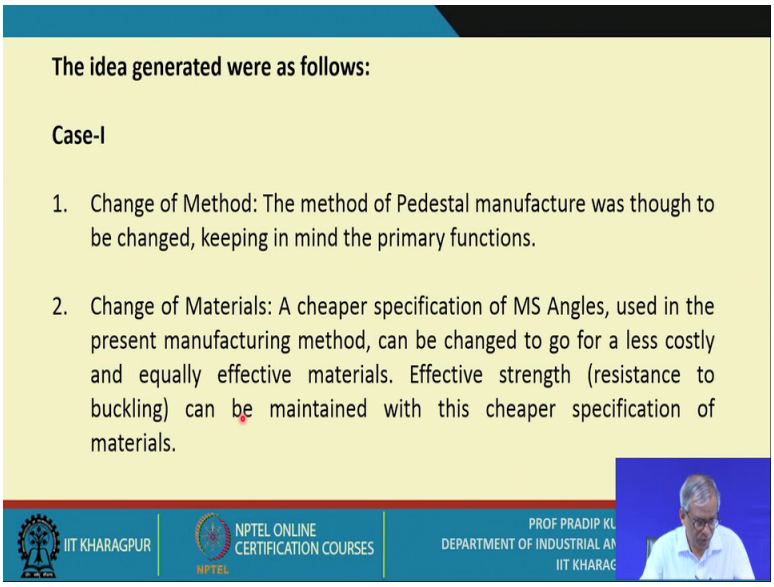

So, all this questions are there. So, the idea generated where as follows change of method that is the one idea; that means; you need to change the method and the change of materials. So, the cheaper specification of MS angles used in the present manufacturing method, can be change to go for a less costly and equally effective materials, is it?

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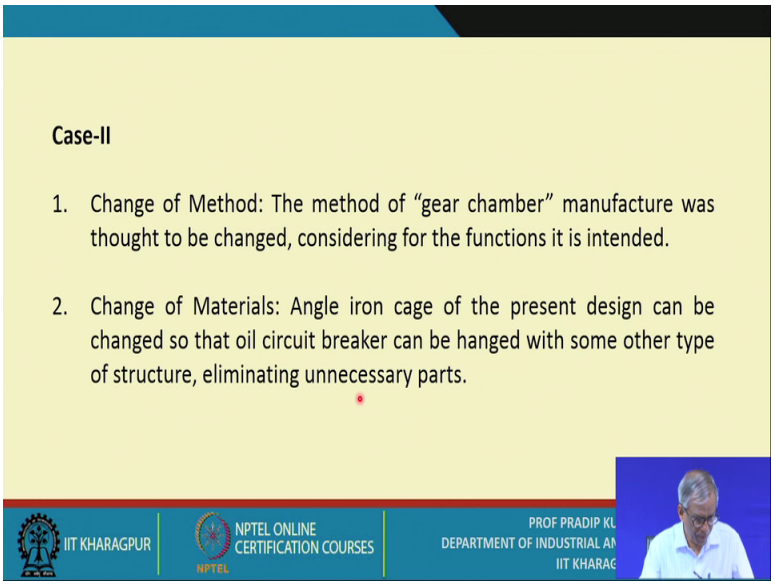

Similarly, for the case 2, we opted for change of method and the change of materials.

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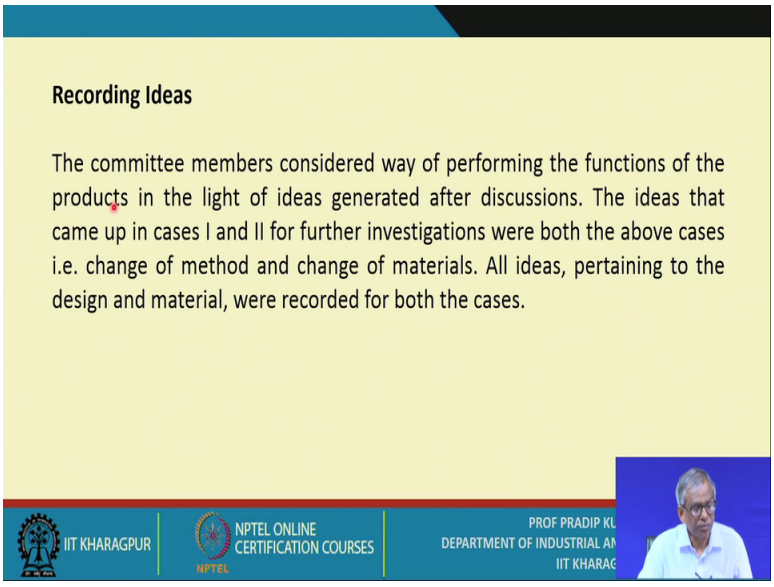

So, these are the 2 decisions we took. And then the we have the recorded the ideas and; that means, the committee is members were involved in recording these ideas. And further and these the ideas are to be recorded properly for further investigation. All ideas pertaining to the design and material were recorded in both the cases.

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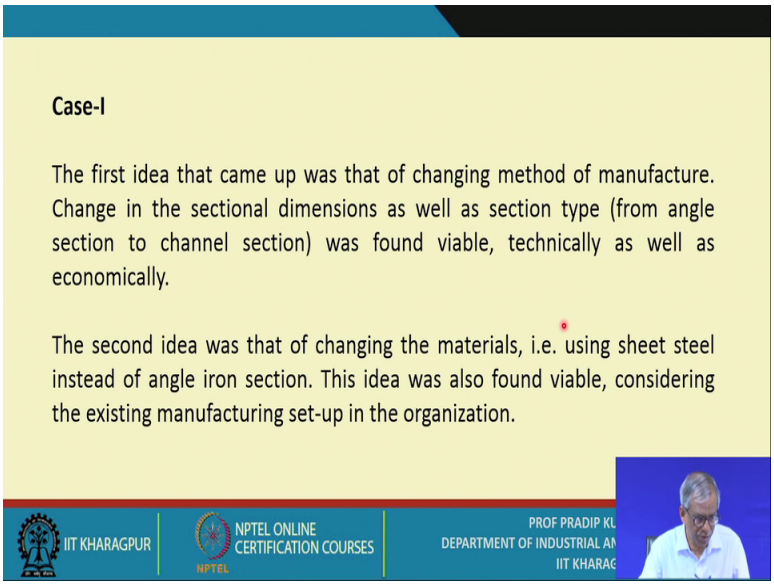

Then so, this is the first idea; that means, we have to change the method of manufacture and the second idea was that of changing the materials.

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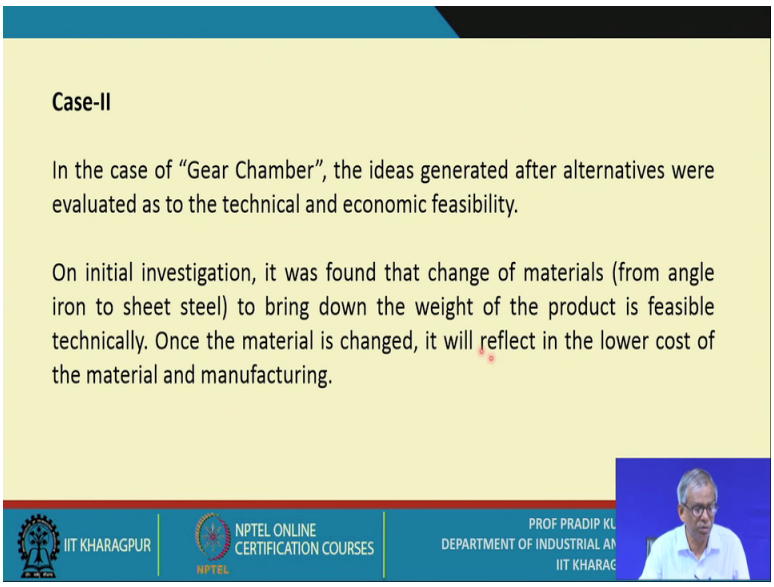

Similarly, for the gear chamber that alternative methods were suggested were evaluated and then suggested. And the change of materials to bring down the weight of the product is feasible.

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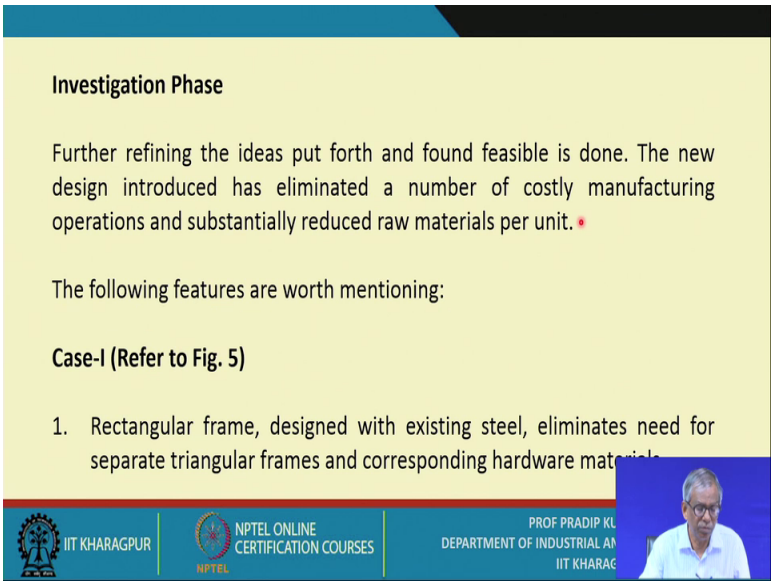

So, this we have also concluded that this is a feasible alternative. So, of we go for the further defining the ideas that is natural. In fact, that means, through the several settings to several meetings. And some of the important features are worth mentioning over here. Like with respect to the case 1 rectangular frame design with the existing steel eliminates need for separate triangular frames and corresponding hardware materials.

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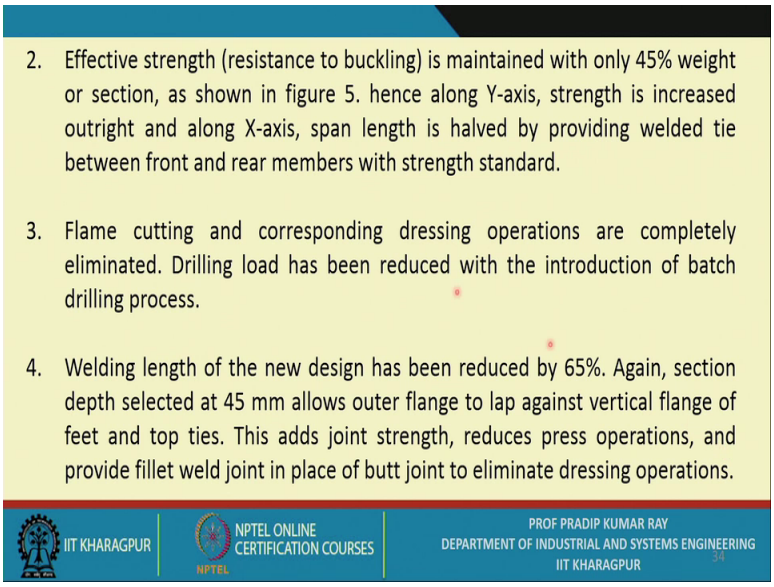

So, these are the important points. So, please go through them in a systematic way we have written all these details.

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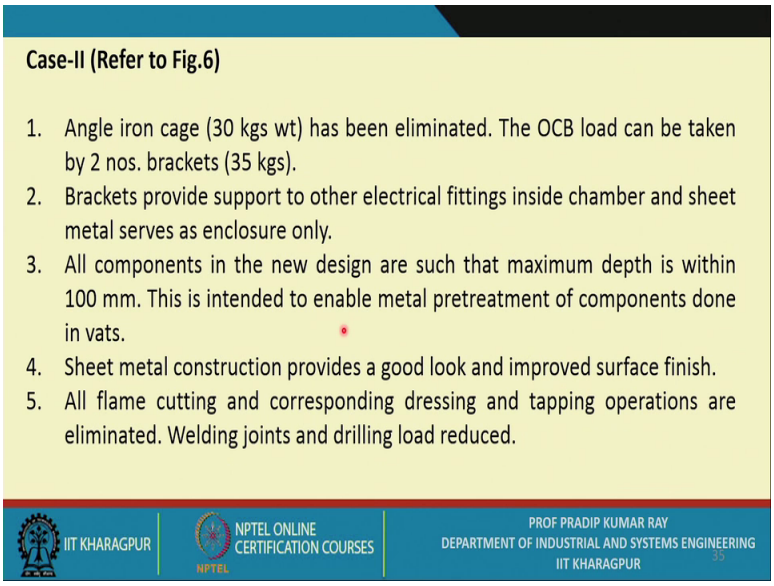

And then again for the case 2, you refer to the figure, and you have all these you know say the suggestions.

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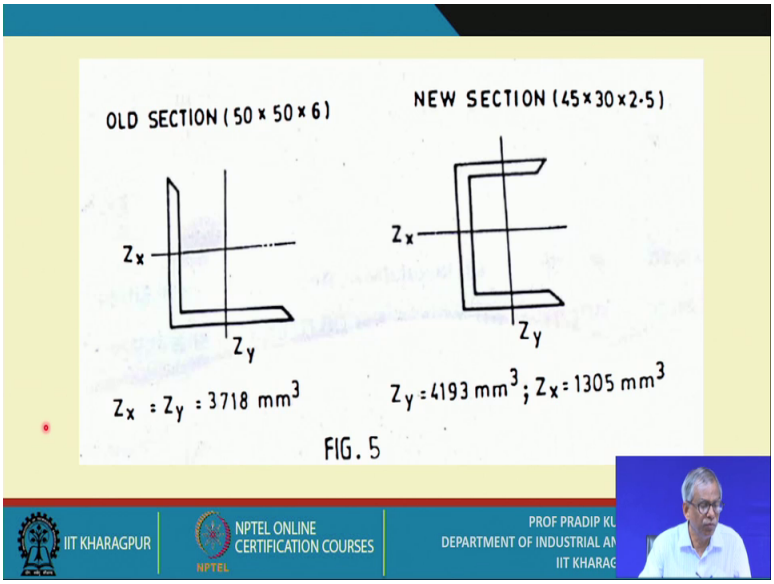

And so, there are 5 suggestions. So, here what you do? That means, for the whole sections we carried out this analysis, Z x, Z y. So, we calculated this as similarly the new sections we calculated the value of Z y as well as the Z x. So, this analysis we do, and for the old section as well as the new section. So, please you know the check or just you verify what are the changes in the, in the sections.

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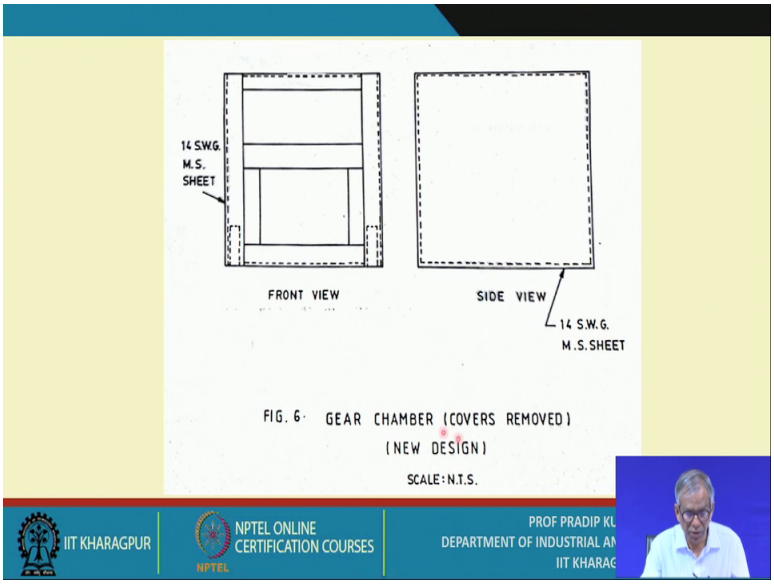

And this is the new design for the gear chambers.

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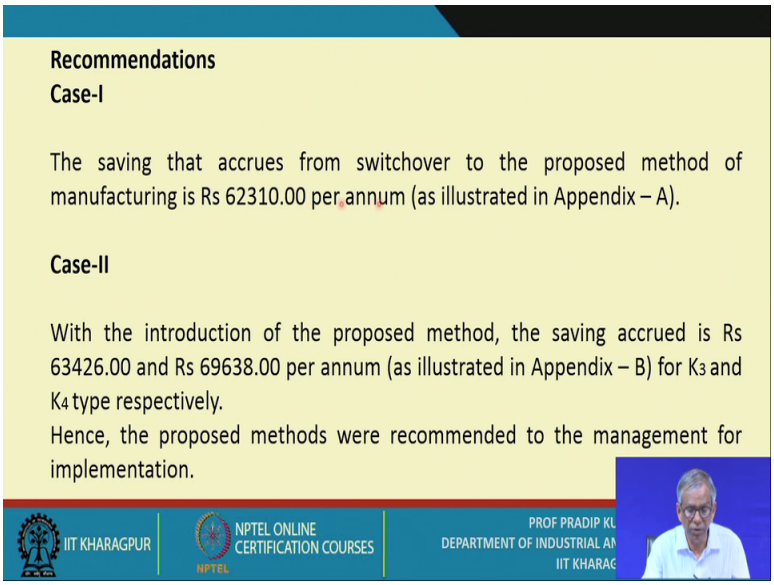

And the there are few recommendations, and this is the savings we calculate for both case 1 as well as for the case 2.

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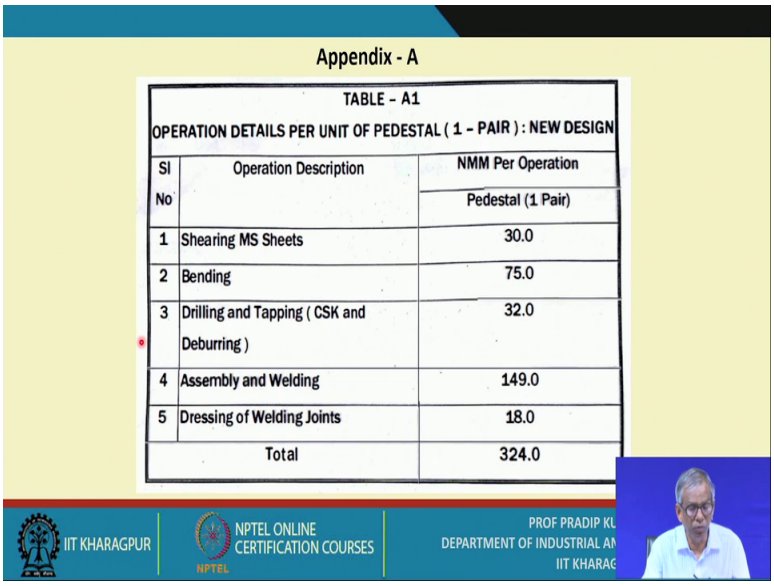

So, the details are given the operation details per unit of pedestal.

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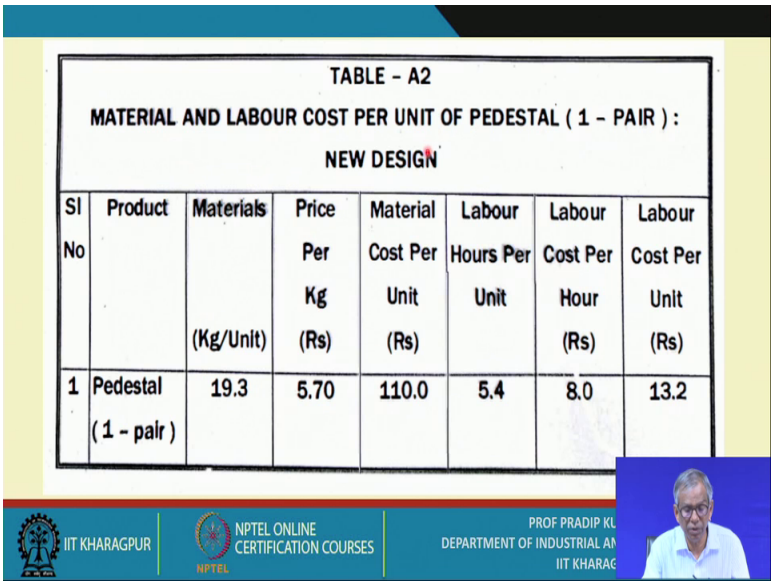

Are this is the material and labour cost per unit of pedestal, 1-pair pedestal all this for the new design we have this breakup.

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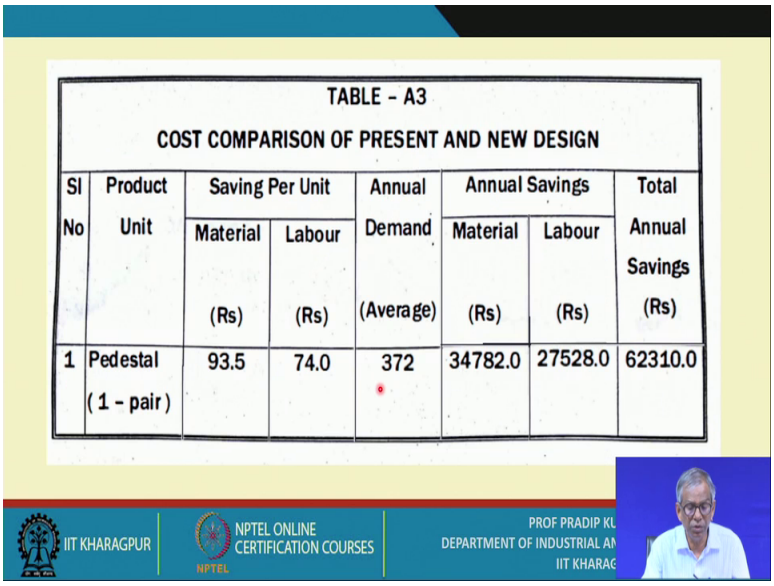

And, similarly the cost comparison of the present and new design.

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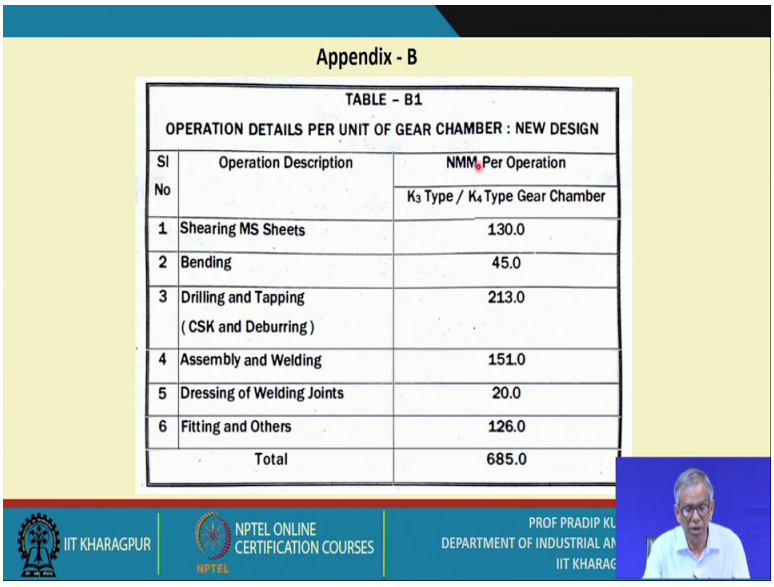

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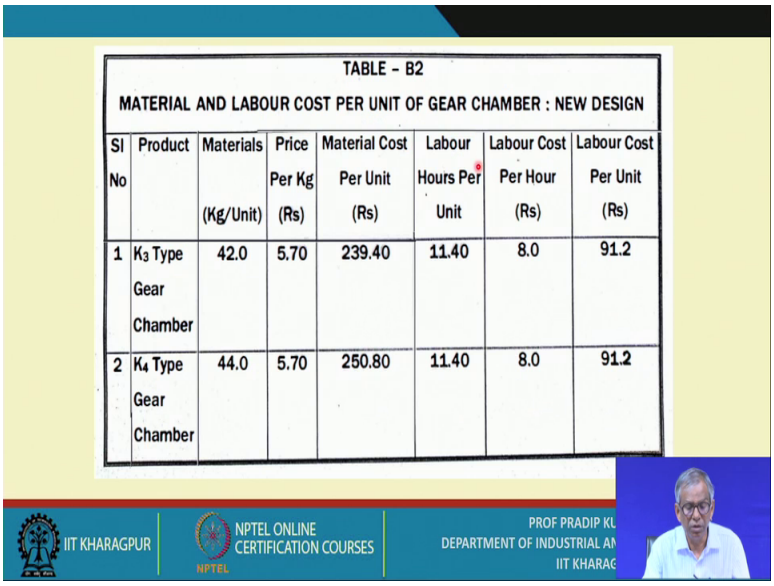

So, all these details are here.

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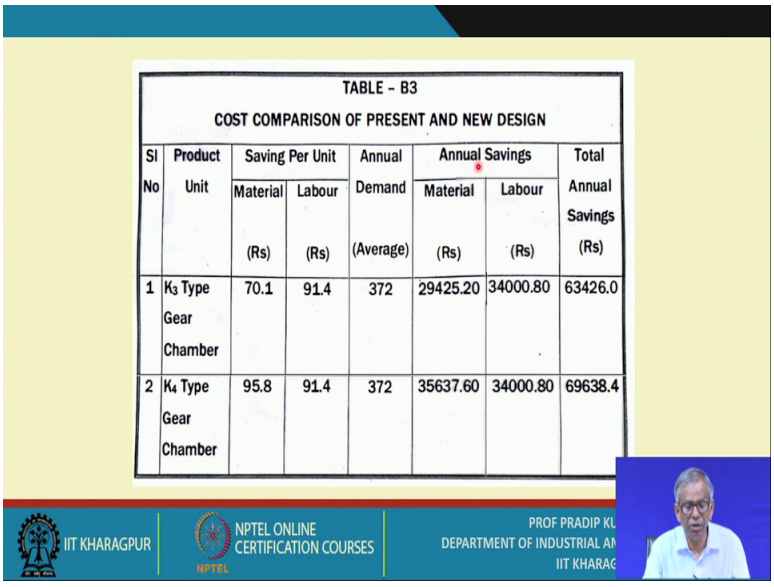

So, you please refer to all these tables.

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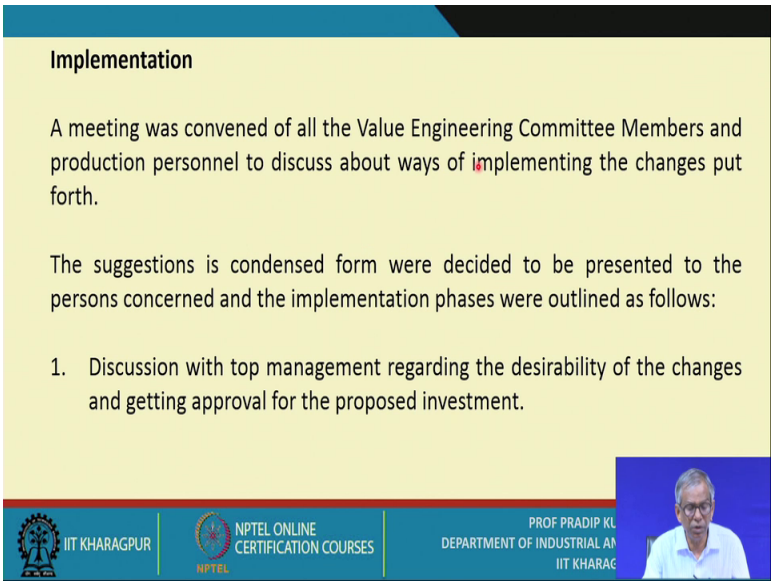

And then we come to the implementation part. So, we have you know the verified or the new designs from the different perspectives. And ultimately we went for their implementation. So, a meeting was convened of all the value engineering committee members and the production personal. And the suggestions are condensed form in condensed from where decided to be presented to the persons concerned, and the implementation phases are outlined as follows. So, this is the implementation phase.

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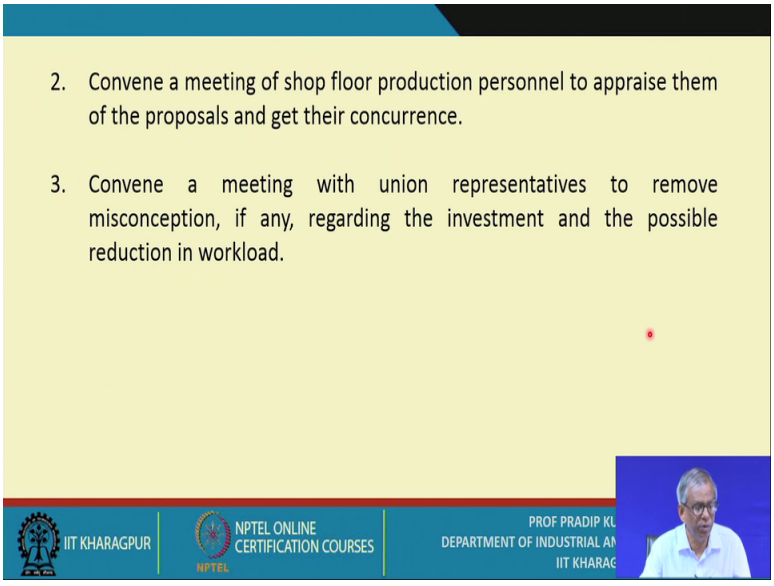

So, in the 3 step implementation phase, and then ultimately we also the convened a meeting with the union representatives to remove misconception if any regarding the investment. And the possible reduction in the workload; that means, you have to be open is approach; that means, the person concerned should be very clearly inform that what are the new changes made, and why this new changes, and to what extent you get the benefits at all levels.

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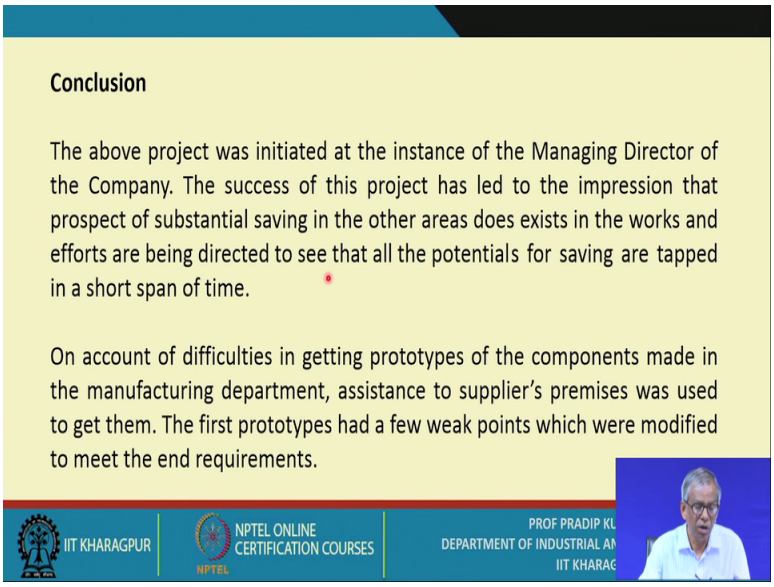

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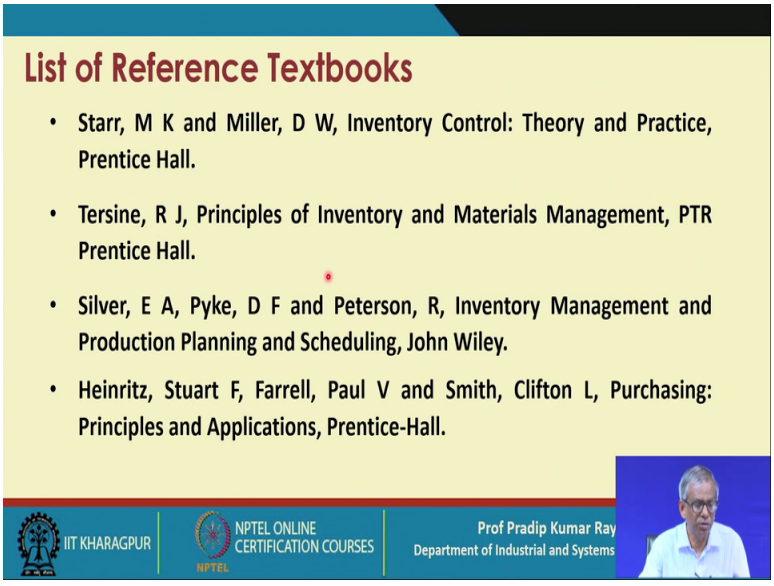

So, this is a case we are referring to, and as you might have noticed that this case study the deals with almost all aspects that to be considered while you implement a value engineering or value analysis say the project. So, please follow or please go through all the details and so that you will come to know that how important such an excise is.

Thank you.