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**Lecture – 08**
**Work Physiology**

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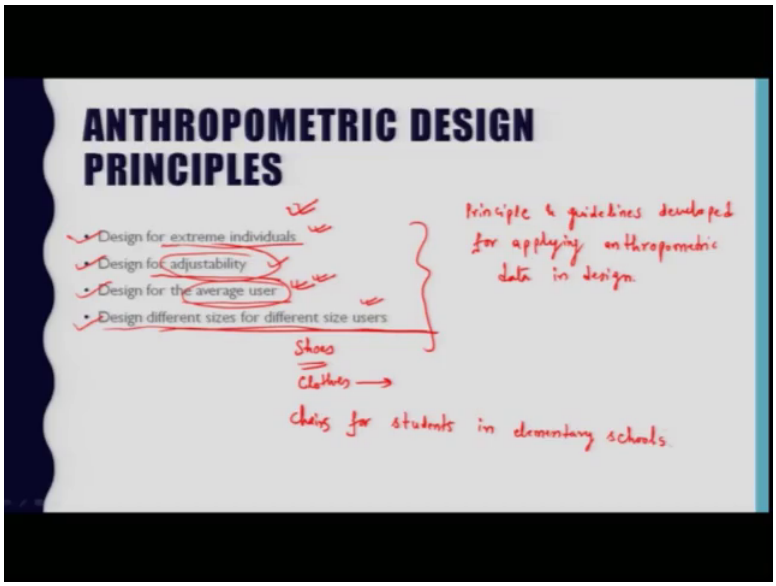


So, another example that we can take for this design different sizes for different users as chairs for students in, let us say elementary school. So, in this way these are the principles.

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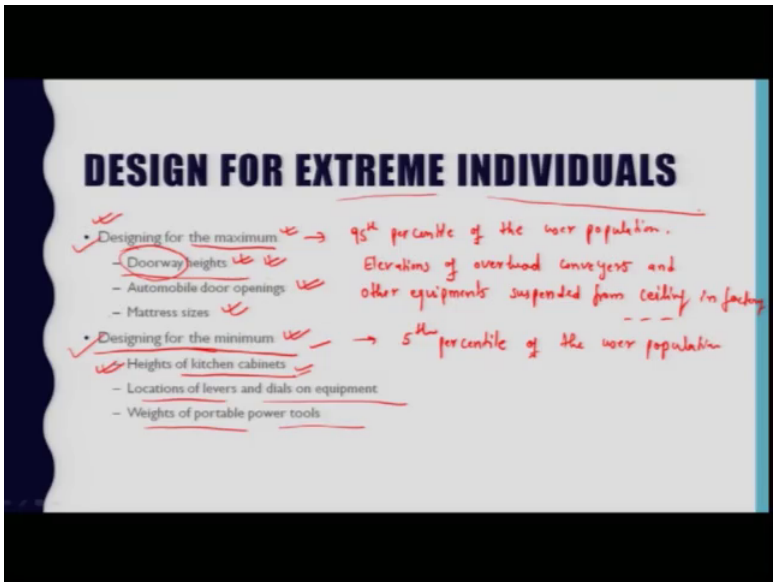


So, let us go one by one in order to explain and in order to understand this with some examples. So, first we will take this design for extreme individuals in that so we can categorize this extreme individual as designing for maximum and designing for the minimum, it means that we have to take care of the maximum height or the minimum height persons. So, if we take an example of a doorway heights. So, in a room there is a door, doorway and we have to if we have to design a door way so the we have to take care of the height of the maximum person that can do entry and exit of that particular door.

So, doorway height is the one of the example in the category of designing for maximum, automobile door openings, mattresses sizes and as far as designing for the minimum is concerned. So, the this is the opposite situation of the designing for the minimum, in which design features must accommodate the fifth percentile and here as if you go for design for maximum here you take the about 95th percentile of the user population. So, example of this the designing for the minimum body dimensions include the height of kitchen cabinets, location of livers and dials on equipment and weights of the portable power tools. In fact, I am thinking of the other examples of the designs for the maximum. So, other examples may include the elevation of a overhead conveyors and other equipments like suspended from ceiling in factory etcetera. So, in this way so designing for maximum dimension and designing for minimum dimension is the 2 categories for the designing of extreme individuals.

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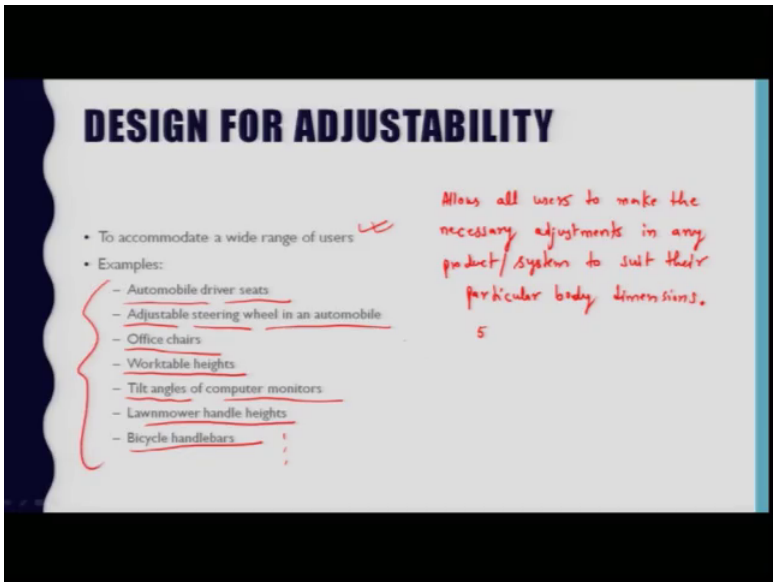


So, now the another category is designed for adjustability. So, in many cases the products are designed. So, that certain features can be adjusted in order to have, in order to give more flexibility for the users and example of this adjustable product features include automobile driver seats, adjustable steering wheel in automobile, office chairs, work table heights, tilt angles of computer monitors, lawn movers handle heights, bicycle handle bars so and so forth. So, designing for adjustability allows virtually all users to make the necessary adjustments in any product or let us say any system, product or system or any equipment to suit their particular body dimensions.

So, the user practice in these cases is to design the adjustment features to include a certain specified range such as fifth to the 95th percentile. So, if the products are intended for both male and female users then appropriate range would be between the 5th percentile for females up to the 95th percentile of for the male. So, that is the case and here are the examples for design for adjustability and you can also use your mind to find out what are the products which has adjustability or flexibility in their one of the parts of the product and you can easily find out these products in your surroundings.

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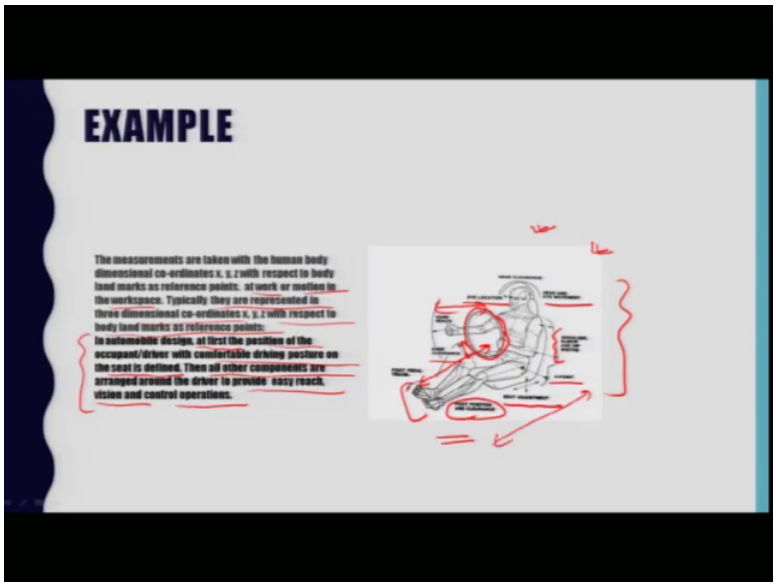


As an example this particular figure you can see a person is sitting inside the car and this person, this person is sitting on the driving seat in fact and holding the steering wheel. So, the measurements are taken with the human body dimensional coordinates x y z with respect to body landmarks as reference points at work or motion in the work space, typically they are represented in 3 dimensional coordinates x y z with respect to the body landmarks as reference points.

So, in automobile design at first the position of the occupant driver with comfortable driving posture seat is defined then all other components are arranged around the driver to provide easy reach, vision and control operation. So, you can see what, although if you sit you do not bother about the various aspects, but at the initial stage of its design and development those facts and your conformability has already been considered while designing a that particular system. So, you can see that the eye location is a main segment, head and eye movement should be there and he has to take care of shoulder elbow and hip width.

So, basically the designers aim is to take care of this hand reach that should be proper knee clearance and there should be a enough distance. So, that person having shorter height, shorter length of its foot can easily go to press those pedals in the form of clutch accelerator and breaks and that is that should be a proper foot position and clearance as well as the seat adjustment is also necessary. So, these are the important points that need

to be considered while designing a driver seat in a in a 4 wheeler. So, these are the very important points and here this particular example you can take it as a design for adjustability.

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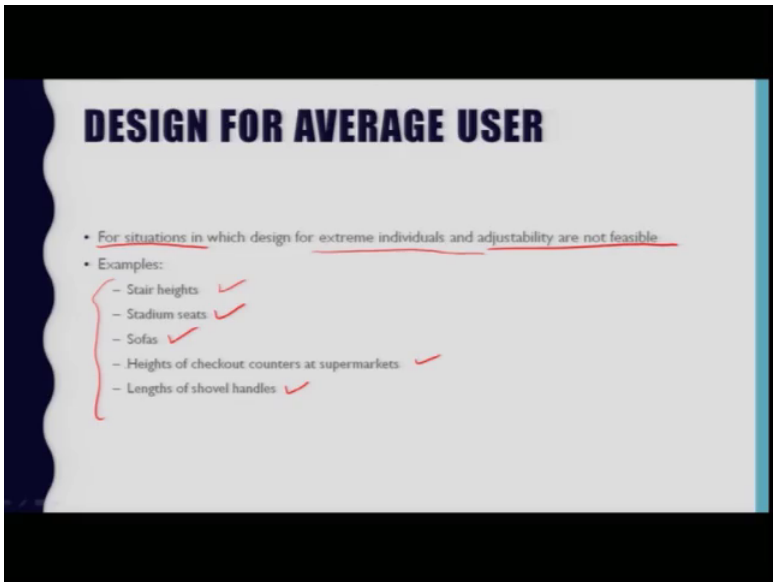


So, another category in which design discrimination can be performed is design for average user. So, in which the situations you can take it as a there are certain situations where the principles of deigns for extreme individuals and design for adjustability are not appropriate. So, the notion of extreme individuals is not applicable to the design problem and designing adjustable features in to the product is itself impossible or cost prohibitive. So, we have to take care of the cost also. So, in this cases the compromise is to design for the average user that is the 50th percentile point.

So, here as the line is suggesting that this particular design for average user is for the situation where the design for extreme individuals and adjustability are not feasible. So, examples are stair heights so when you go up to some floor so stair heights, if you use the stairs in order to ride to the next level. So, stair heights are very much important factors which is generally aim to design for average user, stadium seats, sofas, heights of checkout counter at supermarkets and length of the shovel handles. So, these are the sharp examples which you can relate and which you can put in the category of design for average users.

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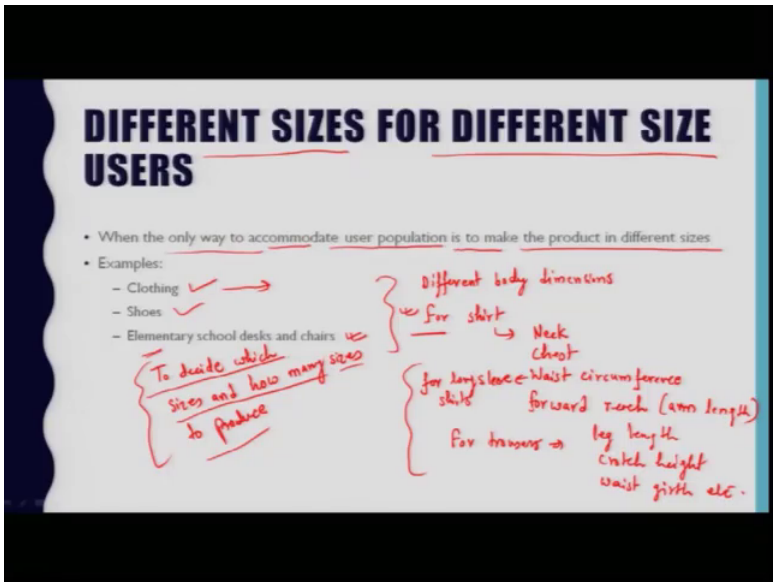


So, another kind of category is category is different sizes for different users. So, there is a kind of design like in some product situations only way, only way to adequately accommodate the user population is for the same product to be made available in different sizes. So, important example of this particular situation is clothing, shoes, elementary school desk chairs. So, these are the basic examples which you can have in the category of designing different sizes for different size users. So, let us say in case of clothing if you look in to so a different body dimensions are there. So, if you think for a while that if you think let us say for shirt, this is a very basic example that you can correlate and you can easily find out enormous real life examples which you can correlate with this particular situation.

So, I am taking here as a shirt. So, the here in this while designing a shirt the important dimensions are neck, you have to take care of the chest dimensions, you have to take care of waist circumferences, forward reach, you have studied in the previous lectures that how we will be managed, will manage to calculate the distinct dimensions of various parts of the body in the anthropometry. So, the forward reach also that is you can say as a arm length any other thing that is, that can be this waist circumference you can treat as a for long sleeve shirts, for long sleeve shirts. So, these are and for trousers you have to take care of leg length, crotch height and waist girth etcetera so and so on and these kind of anthropometric data which are available for all body dimensions that are used by the clothing industry to design garments in different sizes. So, the problem for individual

garment companies is to a garment in different sizes. So, this problem is to decide, is to decide which sizes and how many sizes to produce. So, this is the big challenge when it comes to the design for different sizes for different size users because the variety of user is huge and as a company you have to decide which sizes and how many sizes to produce.

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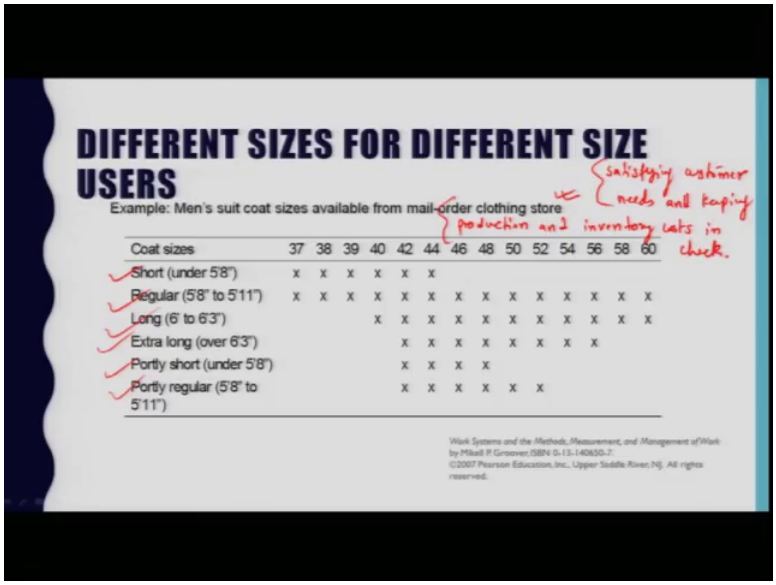


So, like an example you can take that men suit coat sizes available for male order clothing store. So, that is different sizes are there short, regular, long, extra long, portly short, portly regular. So, this is the table that is giving you. So, you can easily imagine the inventory problems and the challenges in the garment industry is to find out the right balance between satisfying customer needs and keeping production and inventory cost in check. So, the major concern is here to satisfying customer needs and obviously, keeping production and inventory cost in check. So, these are the challengers which those industry face, industries face and based on which they decide their course of action.

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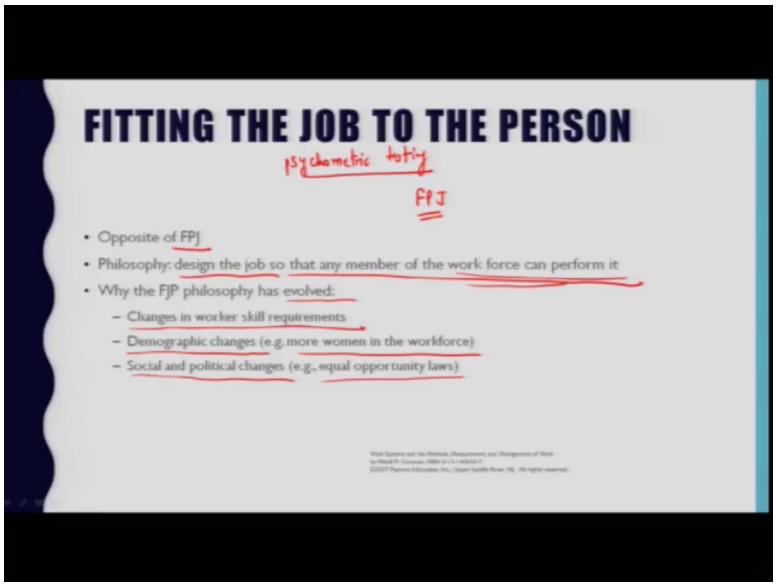


So, now after accomplishing this various designing aspects let us have a brief look about 2 philosophies based on which the decision is made the in terms of ergonomic, ergonomic consideration. So, there is 2 philosophy the fitting the person to the job and second is fitting the job to the person. So, first we will go for the fitting the job to the person so obviously, it is opposite to the FPJ fitting the person to the job and this common employment practice prior to ergonomics that was based on this philosophy called fitting the fitting the person to the job.

So, which recommended that the worker we selected on the basis of their mental aptitude and a physical characteristics for a particular job opening so that involves also stated in the first slide in the introduction that various test is use to required that let us say psychometric test, this test is used for checking the intelligence and personality characteristics and so a workers physical attributes were used in the selection process of the job requirement or job requiring characteristics such as size and strength also.

So, in now FPJ approach is also used is considered among the eligibility factors for certain position in many hiring situations today itself. So, here the fitting the job to the person it is the philosophy that designed the job. So, that any member of the workforce can perform it and why the FJP philosophy has evolved because the changes in the worker skill requirements, demographic changes like more woman in the workforce, social and political changes equal opportunity laws.

So, now, that ergonomic approaches diametrically opposite to FPJ. So, the philosophy in ergonomics is fitting the job to the person, like designing the job so that nearly any member of the work force can perform it. So, basically there are several factors that explain why the new philosophy has evolved and now occupies that position that operates in a parallel within sometimes supersedes the FPJ approach.

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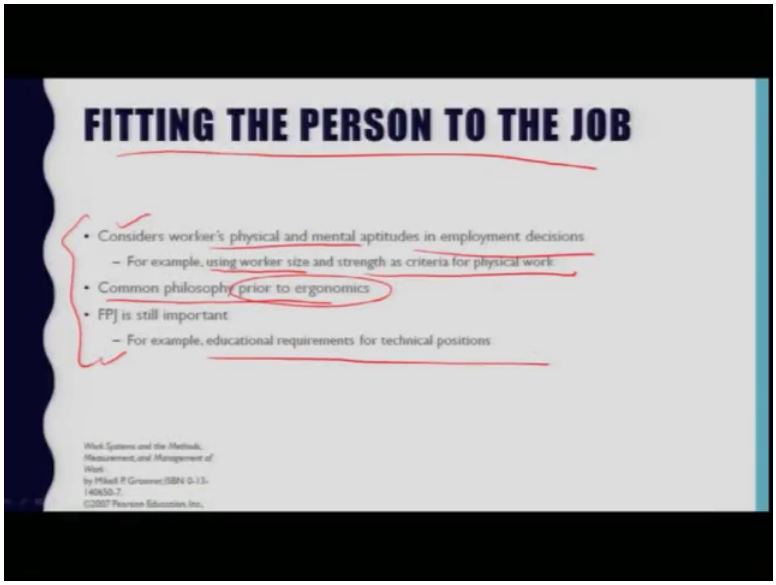


So, the second thing is fitting the person to the job in which the, consider workers physical and mental aptitude employment decisions. So, using workers size and strength as a criteria for physical work it is a common philosophy prior to ergonomics and like FPJ is also nowadays is being adopted by several, in a several hiring sectors like for example, educational requirement for technical positions that is the one of the interesting example in that category. So, FPJ is still important in this regime.

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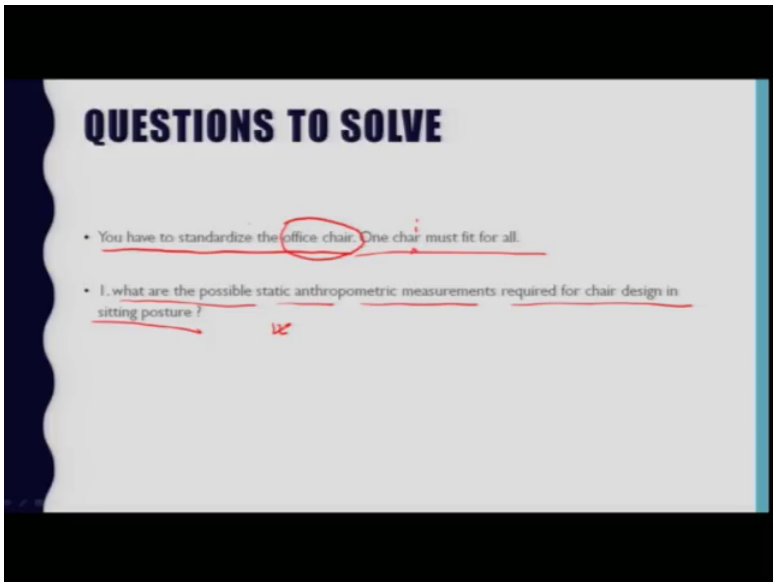


So, now finally, one question for you which you have to find out, that you have the task that has been assigned to you that you have to standardize the office chair. So, one chair must fit for all and you have to find out that what are the possible static anthropometric measurements required for a chair design in sitting posture. So, that you need to find out, first you have to take care of the problem statement that if you have to standardize office chair so what kind of anthropometric measurement do will you consider in order to design a chair. So, think about those things and recall previous slides. So, that you could be having a better idea of what are those measurements and what you have to consider in order to design this office chair, basically I have also put the answers of that. So, somehow you can correlate with this positions, there are several dimensions of the human body in a static or seated condition.

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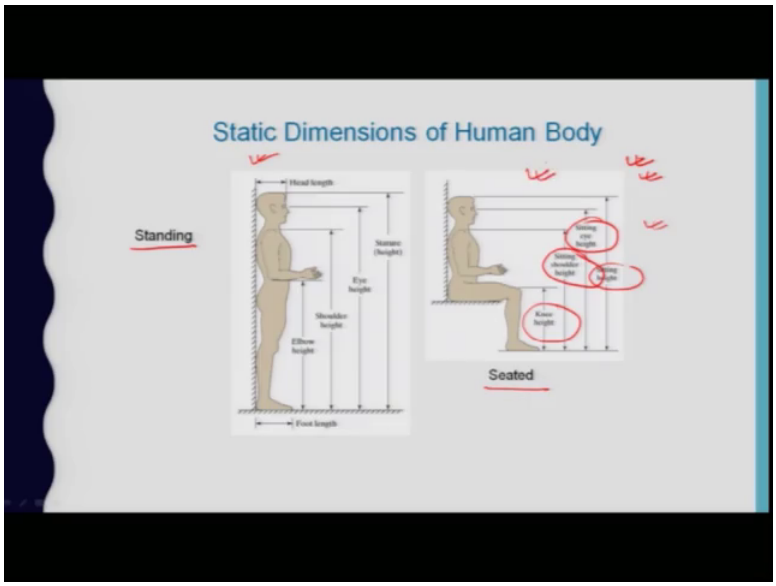


So, in a seated condition you can think of sitting height, sitting eye height, sitting shoulder height and knee height so these are the basic 4 dimensions that you can consider while designing office chair and a lot more things are required that you need to think and you have to accumulate those data's which are required in order to design a office chair.

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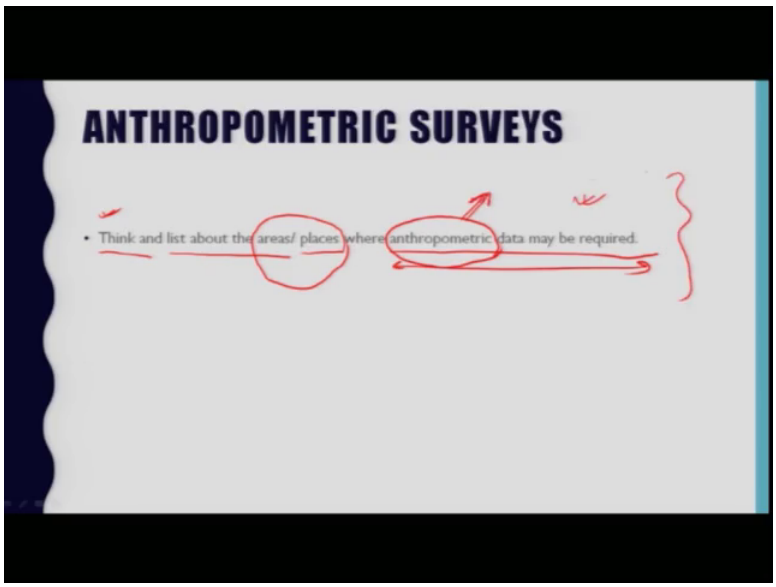


So, and another thing that I am giving to you it is up to you and you have to use your mind in order to think towards this problem which is you have to list about the areas and places where anthropometric data may be required. So, we have now covered this

anthropometric topic and have got a clear idea about what this particular anthropometry is all about and what now you have also developed understanding towards this anthropometric data and how you can calculate it and what are the, but you have to find out and you have to think and you have to visualize in your surrounding that what are the areas and places where you can implement this anthropometric knowledge and the and finding out the way how you can come to contribute in this particular area.

So, ergonomics is just about to correlate the happenings in your surrounding and what best you can provide in terms of solution in order to improve the efficiency of that particular system. So, this anthropometry is one of the ergonomic area where the people can contribute. So, think of about that and list out those places where this anthropometric analysis can be performed.

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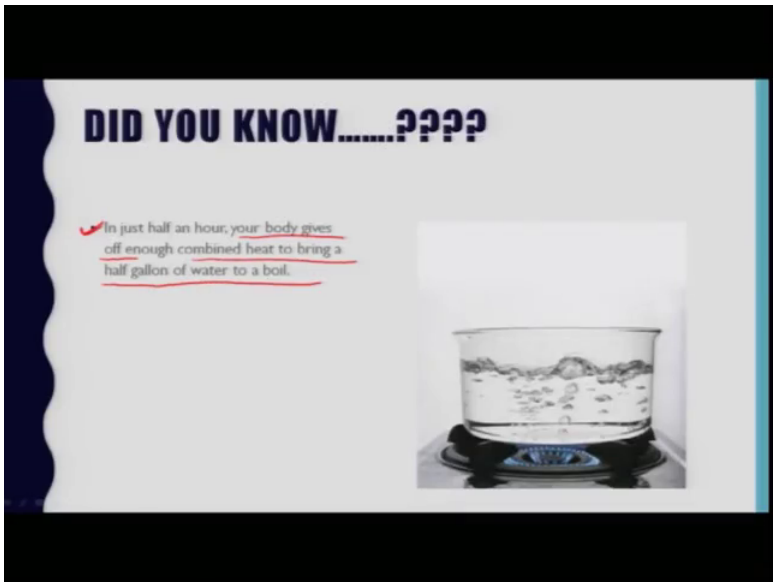


So, this is regarding lecture closing and before that just of the fact that just to have a statement in just half an hour your body gives off enough combined heat to bring a half gallon of water to boil and just I have added some fact and it is up to you.

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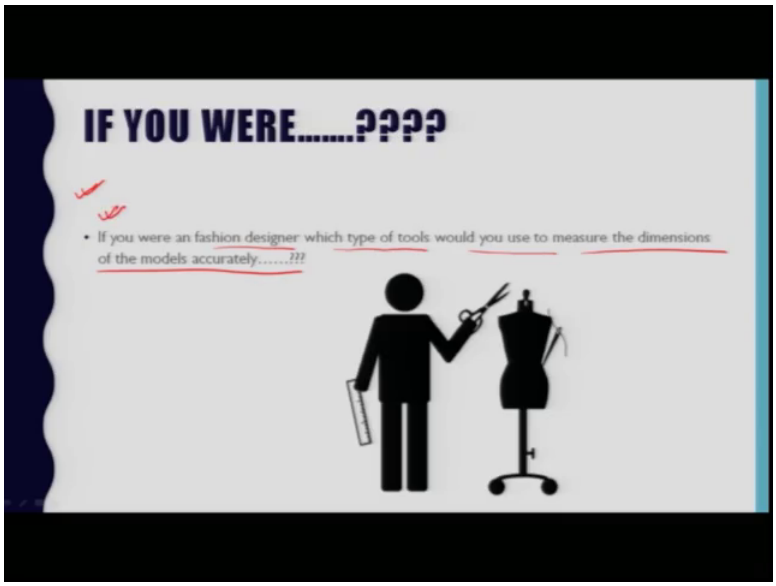


Now, you have to use your mind, that if you were a fashion designer which type of tools would you use to measure the dimensions of the models accurately.

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So, think of this situation and try to answer this question and just a graffiti I have added like I pruned a tree once. So, technically I am allowed to put branch manager on my resume. So, thank you very much that is all for now. So, please read anthropometric from recommended difference text books for enhancing your understanding towards this course and this topic as well.

Thank you.