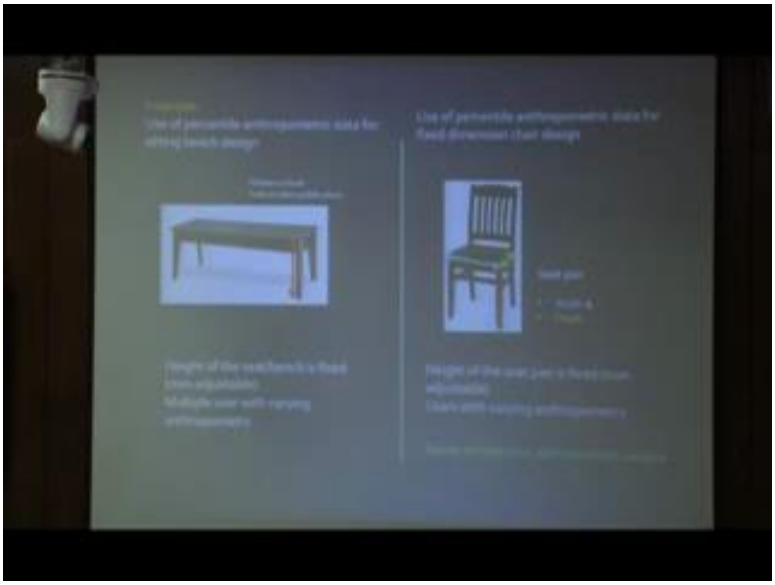
Digital Human Modeling and Simulation for Virtual Ergonomics Evaluation
Dr. Sougata Karmakar
Department of Design
Indian Institute of Technology, Guwahati

Lecture – 04
Use of percentile anthropometric and biomechanical data for product design Part II

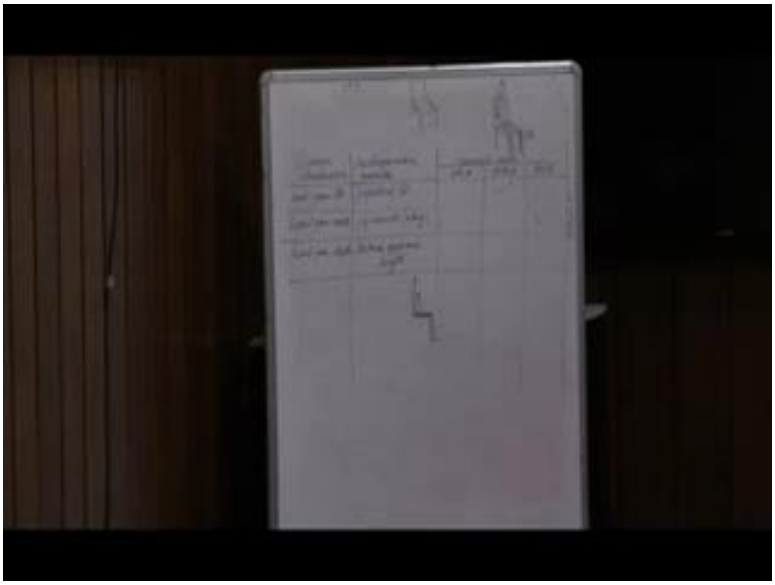
After discussing the example of this primary school bench that how you can decide the height of this bench, now we are moving to another example.

(Refer Slide Time: 00:01)



In this we see the chair. So, how to decide this various dimension; height of the chair, the (Refer Time: 00:37) and height, width and depth, how you can decide. Which percentage anthropometric data should we use? For this purpose first we have noting down you want to design a chair. So, for these purposes imagine this is a chair.

(Refer Slide Time: 01:04)



So, to design this chair or deciding various dimension of the chair you need to know design dimension. Here in this column we are writing design dimensions. What is design? Our first discussion is about height. So, (Refer Time: 01:47) height. For that purpose which corresponding anthropometric variant. Say, considering 3 percentage data fifth 58 and 95th. So, this is fifth percentile data 58 and 95th. So, here design dimension is seat height.

For seat height if you want to design this seat pan height for that purpose what is the corresponding anthropometric variable, corresponding anthropometric variable is popliteal height. Now which percentage should we use? If this is that individual who is sitting now I have to decide this one popliteal height, which percentage data should we use? As in the case of bench we show we have just see that people use fifth percentile 58 percentile 98 percentile what will happen. To accumulate good number of people, good number of individual if we use in this case we should go for 50th percentile. If I use 50th percentile data what that value from the anthropometric data book anthropometric data set we can identify that 50th percentile of n.

So, for deciding the seat pan height we need to know the corresponding anthropometric variable is popliteal height and which percentile data should we use. We have only 3

options that is fifth percentage 58 percentile 98 percentile. So, first we have to mention that this chair is, chair what we are discussing this is a fixed height chair. There is no adjustable feature so everything is fixed dimension.

So, if I want to decide the height of this chair or seat pan for that purpose we need to know the corresponding anthropometric variable that is popliteal height. Now, if we have the popliteal height data for a particular population then we are using 50th percentile. Why? Because already we have discussed during that example of the bench that people use 50th percentile data for that design purpose then good number of people whose body dimension is nearby that 50th percentile value of that particular anthropometric variable they will be accommodative.

For this reason people use 58 percentile data. Obviously, 58 percentile people with 58 percentile popiliteal height they can we are call it 58 percentile in the start from 48 percentile to up to 68 percentile they are comfortable. But people with your percentile popiliteal height or with higher percentile popiliteal they may not be comfortable. But if student with your percentile for that purpose what we will do, we will make a foot list. If we put a foot list the student width say for example, fifth percentile they seat keeping the leg on the foot list. On the other hand for 98 percentile what they will do, they will extend their leg forward. As more number of people popiliteal height value is nearby average value or 50th percentile value, so good number people will be accommodated if we use 50th percentage popiliteal height value for seat pan height determination.

Next, so seat width. Next design dimension is seat pan width. In case of seat pan of width what is the corresponding anthropometric variable for seat pan. This is a dimension, this is the seat so this distance side sidewise. If we are deciding the seat pan width in case of seat pan width which is the corresponding anthropometric variable while people are sitting that is the heat breath. So, see corresponding anthropometric variable is see heat (Refer Time: 07:45) and out of those abbreviate data which percentile should we should use 95 percentage, because people use 98 percentage in. So, this is very important in this case we are not using 50th percentile we are using 98 percentile.

People use 95 percentile data, then what is happening? All people whose seat (Refer Time: 08:12) is based on the 98 percentile everybody can use that. Even you can go for more than 95 percentile (Refer Time: 08:19) value, because entering seat width with little bit more there is no problem. So, if you got width level to sit there.

Next, seat pan width; seat pan width means forward, backward, this distance. Now I am discussing about this is (Refer Time: 08:57) distance, (Refer Time: 09:01) this one. This is called seat pan width for that purpose which is the corresponding value discussing about the seat pan depth which is the corresponding anthropometric variable; corresponding anthropometric variable is buttock popliteal length. If we see the seat say if you see the seat from first discuss about the height then width then it is forward backward distance from; forward most, backward most point. So, this seat depth for that purpose or corresponding anthropometric variable is if we sit from back side from in this buttock to popiliteal, this distance is important, this buttock popiliteal length that is considered for deciding the seat pan depth dimension.

Now, which percentile data we will use? There are all the 3 option; first fifth 50th and 95^{th}. If we ask out of these 3 percentiles which percentile buttock popiliteal length value should we use for determining the seat pan width. If we use 50th percentile then what will happen. If we use 50th percentile for this purpose then 50th percentile person this dimension exactly matching as per 50th percentile. So he is comfortable but, another one so this is the seat or side view. So, which is exactly matching or 50th percentile because which is designed as per that dimension. Now further about fifth percentile for fifth percentile they will sit.