**Applied Ergonomics**
Prof. Shantanu Bhattacharya
Department of Mechanical Engineering
Indian Institute of Technology, Kanpur
Dr. Ankur Gupta
School of Mechanical Sciences
Indian Institute of Technology, Bhubaneswar

Lecture – 28

Welcome to this lecture. Today's topic is Tools and Techniques used for Ergonomics. Today we will know what are the tools and techniques used for ergonomic assessment and, in context with the knowing what kind of methods or tools or techniques available for analysis in the ergonomic area. So, before that we have to understand that what is the role of ergonomic person?

(Refer Slide Time: 00:50)
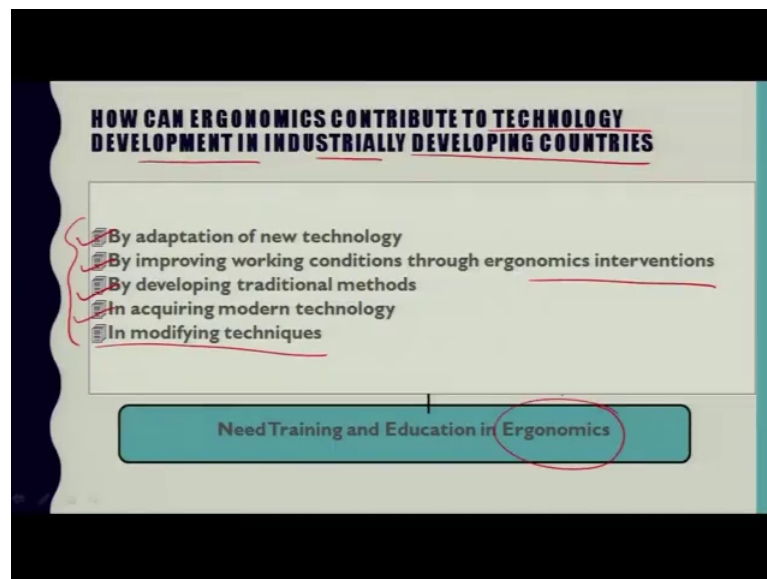
So, and as well as how can Ergonomics Contribute to the Technology Development in Industrially Developing Countries.

This can be achieved by adaptation of new technology which is already present in western countries and it can be achieved by improving working conditions through ergonomic interventions, it can also be done by developing traditional methods in acquiring modern technology, and also in modifying existing techniques. It these all factors need training an education in ergonomic. So, that they could experience the

existing situations and based on their experience and knowledge they could contribute towards ergonomic.

(Refer Slide Time: 02:04)
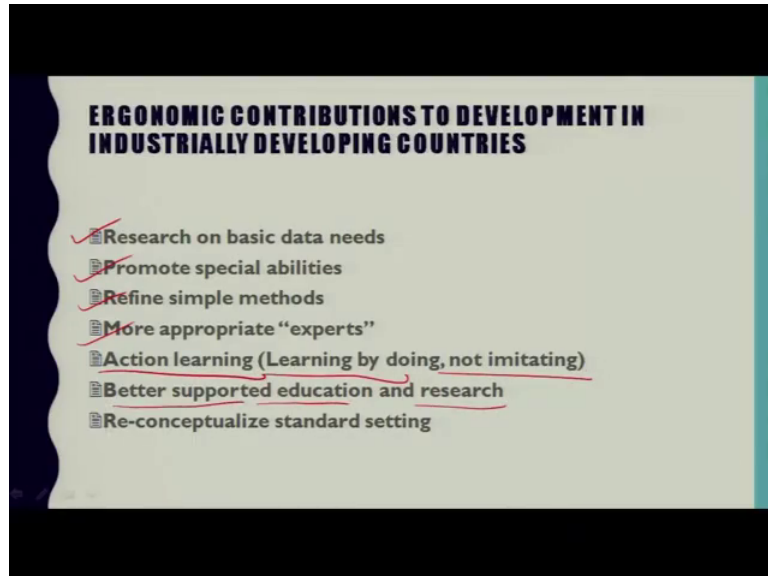
So, as far as ergonomic contributions to development in industrially developing countries; the research on basic data needs the promotion of special abilities. So, and refining of simple methods, more appropriate "experts", action learning like learning by doing, not imitating and better support better supported education and research as well as re-conceptualize standard settings.

(Refer Slide Time: 02:41)
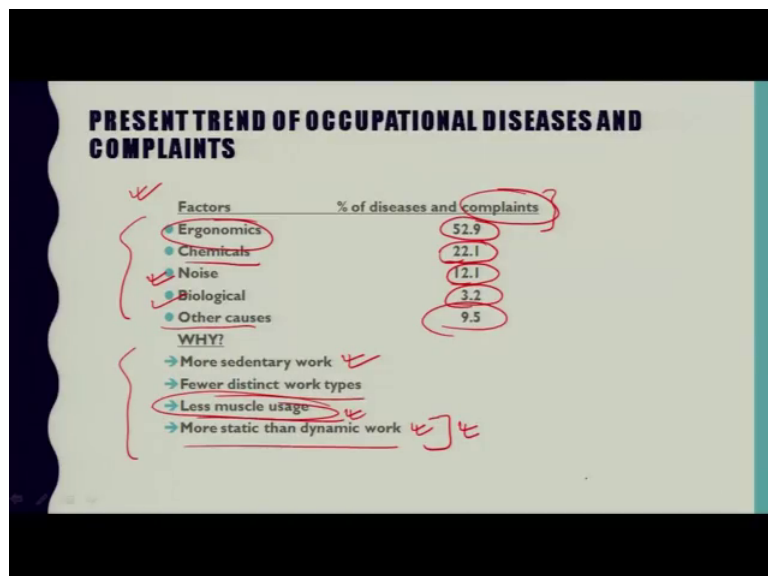
Why this ergonomic is important because as far as if you will observe these facts that is given in this particular slide. So, you will come to know that due to inadequate attention given towards the human factors there are lot of diseases and complaint emerged out in the system.

So, this is a present trend of occupational diseases and complain where this particular Ergonomic factors are having maximum percentage of diseases and complaints, there are various Chemical factors in industries that particular factor is having about the 22 percent of diseases and complaints, Noise factors are having 12 around 12 percent of diseases and complaints Biological factors are having some approximate 3 percent and Other causes are having around 9.5 percent.

These are the major factors responsible for several disorders or disease or the factors that are adversely affecting the systems performance, these all complaint have emerged out because of several reasons in any organization. So, mostly in any organization these complaints have come out because of more sedentary work, Fever distinct work types, Less muscle usage the appropriate physical effort is also important in order to maintain a humans health particular persons health and More static than dynamic work like nowadays this computer workstations work the is a mostly being performed by workers in any organization. So, it also leading towards several diseases and lot of a complaints regarding a person's health.

Now, we will slowly moving towards knowing tools which is now a days being used in anthropometric analysis. So, as we are aware this particular anthropometry is a very important part of ergonomic.

(Refer Slide Time: 05:25)
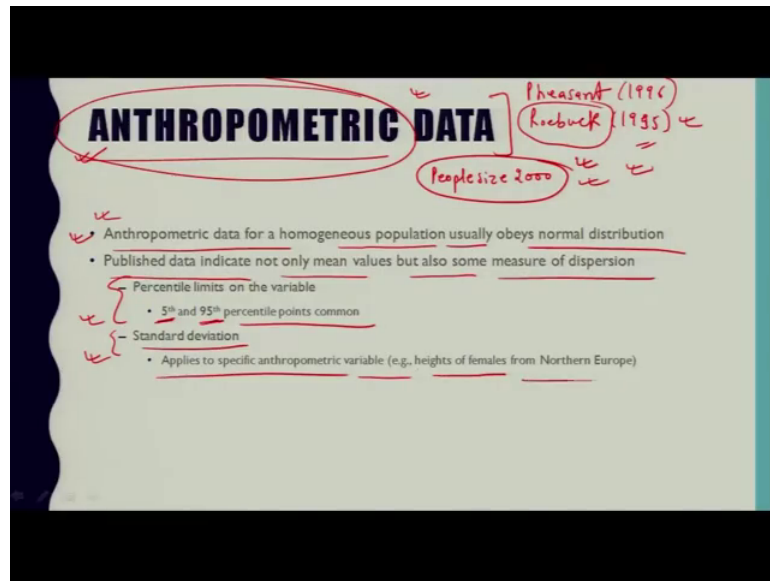
So, first of all just to recall that what is this anthropometry is all about? So, Anthropometry is derived from Greek word Anthropos means human and Metron means measure. Basically refers to measurement of human individual, this anthropometry place a very important role in industrial design, clothing design, ergonomics and architecture where statistical data about the distribution of body dimension in the population are used to optimize products.

So, changes in lifestyle nutrition and ethnic composition of populations lead to changes in the distribution of body dimensions. So, this variation because of this variation the analysis is now becoming more complex as the days are passing. It also requires regular updating of anthropometric data collection like for a workstation platform is aim to design. So, that it will suit for all worker workers are different in many aspects such as like that variability can be because of age, height, physical sizes of a individual persons etcetera.

So, the analysis of human body should be necessary in anthropometry data and anthropometric aspect and there are very good sources of anthropometric data are available like every country. In fact, has a separate data based on their age of population and ansible researches have also accumulated that data based on the discrimination of their age and ethnicity as well.

So, in 1996 one scientist was named as Pheasant, in 1996 and one another scientist named as roebuck in 1995. So, they provide the anthropometric data of civilian basically this roebuck is from US. So, he provides he provided anthropometric data of civilian in United States and another kind of software which you can think to perform this anthropometric analysis. So, one software I am recalling here that name is people size 2000. This is a particular software package that allows a user to click on relative measurement and then select age, group, and nationality and percentile value. In this way this particular software will give you proper value of a relative measurement of various parts of a body.

Anthropometric database was at the house outset initiated by one scientist named as Armstrong who was working in aerospace medical research laboratory, this was all about the history of anthropometric data capturing. Now as far as this analysis is concerned Anthropometric data for particular size of population usually obeys normal distribution curve, that we have a studied well when we were covering this particular topic individually separately. So, the published data indicate not only mean values, but also some measures of dispersion the mostly this particular choice of a data is made based on the percentile. So, as far as minimum dimension is concerned we choose 5th percentile of the data and if maximum dimension I have stated sufficient example in that particular lecture about in what situation you will choose the 5th percentile and in what situation you will choose the ninety 5th percentile of a particular data.

So, that is discrimination between minimum dimension choice and maximum dimension choice so, here as per the revision of that particular topic. So, 5th and 95th percentile points common. So, we also take care of the standard deviation and based on the standard deviation we collect the data based on the mean and standard deviation. So, this was basically a standard deviation applies to specific anthropometric variable like heights of the female from northern Europe.

(Refer Slide Time: 10:57)
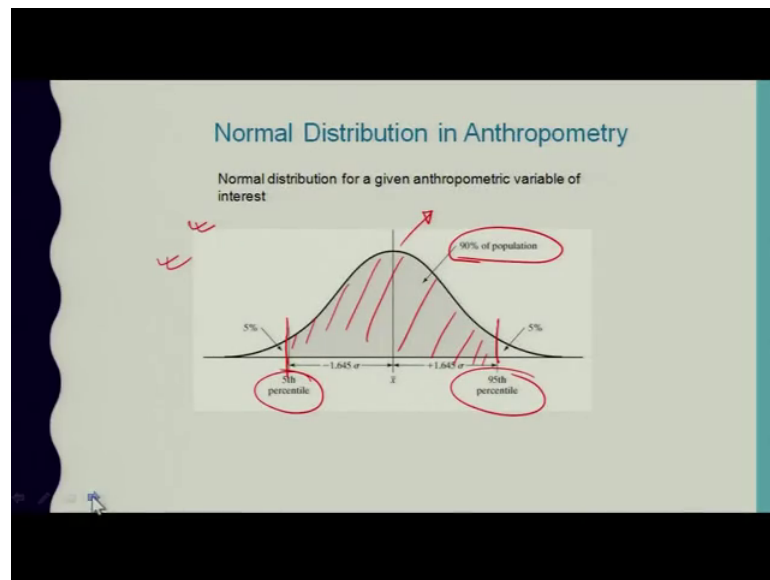
So, this is in brief the normal distribution curve in Anthropometry, in which this particular graph is following normal distribution curve and here this particular portion is capturing the 90 percent of the population information and this particular bar is showing the 5th percentile value and this particular from the right side is having 95th percentile of the value.

For a detailed understanding of this particular curve I have covered this normal distribution explanation in a particular lecture of anthropometry. So, you can revise that particular lecture.

(Refer Slide Time: 11:47)

So, in a nutshell this particular normal distribution curve can be the data can be chosen from that curve on the basis of minimum dimension and maximum dimension. So, a high percentile value of an appropriate anthropometric dimension is chosen. So, as an example while designing a doorway sufficient headroom for very tall people has to be provided and 95 to 99 percentile stature could be used to specify the minimum height doorway should not be lower than this minimum value.

So, this particular doorway is a very easy example that anyone can take and perform the understanding of that particular minimum dimension concept. So, here as far as designing a doorway additional allowance also would be taken care for the increase in the height caused by heels of shoes protective headgear etcetera.

(Refer Slide Time: 13:05)
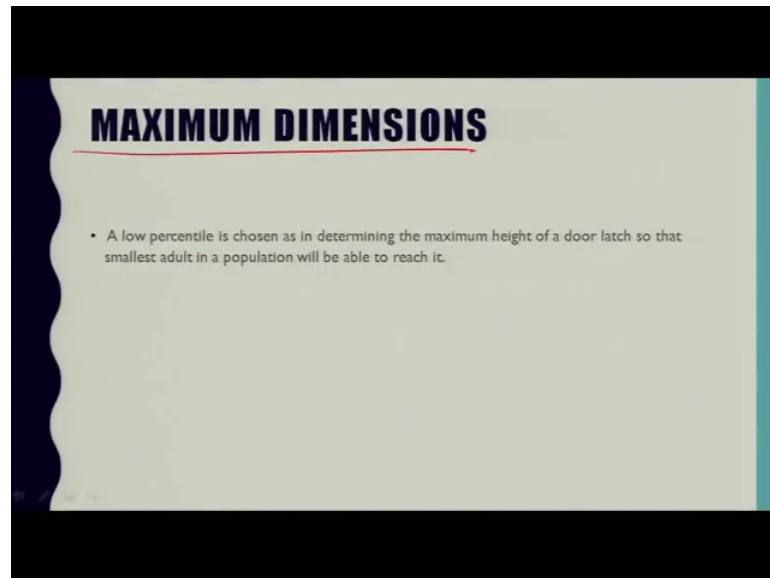
There is one another example of using a minimum dimension is seat breadth as far as maximum dimension is concerned a low percentile is chosen as in determining the maximum height of a door latch so that the smallest adult in population will be able to reach it.

(Refer Slide Time: 13:20)
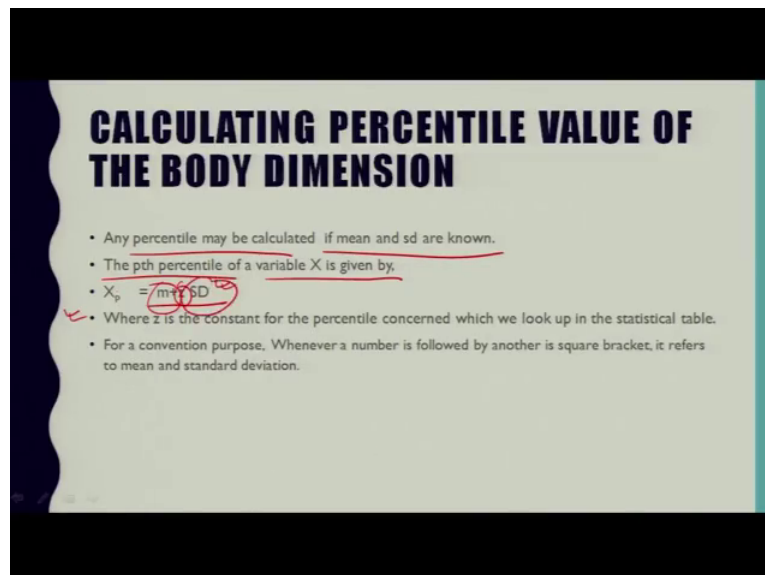
Since we have here applying the choice of percentile value, we also have to have knowledge of calculating percentile value. So, this percentile may be calculated with the help of mean and standard deviation. So, the p-th percentile value can be determined by,

m plus z times is SD, where m is the mean and z is the standard deviation z is a basically z score which is found out with the help of normal distribution curve and standard deviation.

(Refer Slide Time: 14:03)
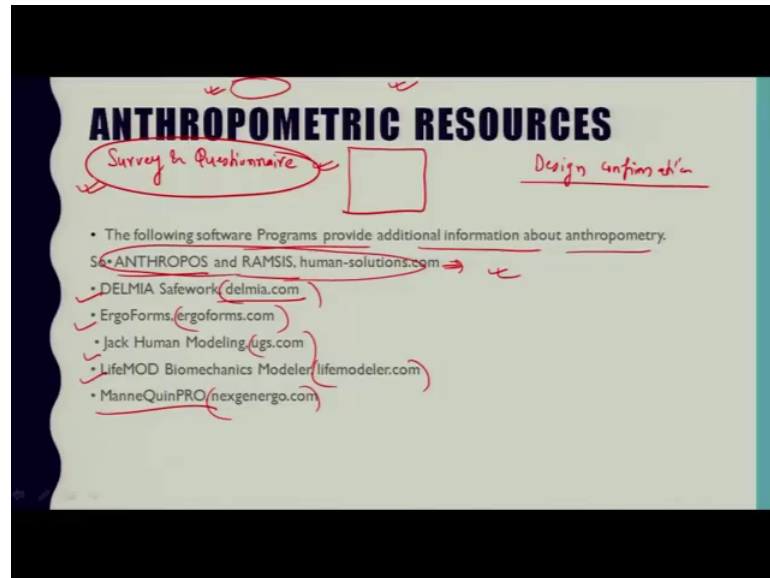
Now coming to the existing resources available for Anthropometric Analysis so there are various software program which provides additional information about anthropometry. So, ANTHROPOS and RAMSIS these are the software tools which give which will give you, basically those softwares allows users to load a virtual human into 3 D space.

Similarly those softwares have been developed like DELMIA Safe work from delmia dot com; Ergoforms Jack Human Modelling, Life MOD Biomechanics and this ManneQuin PRO from nexgenergo dot com. So, these are the softwares that have been developed in order to perform this anthropometric analysis and basically this ergonomic part contains then formation based on the survey and questionnaire. So, this is the powerful tool of survey of a like if they want to let say have some particular designer confirmation. So, what they do they did they generally take opinion of more than 2 hundred people and by just formulating a questionnaire and on the basis of questionnaire they try to take opinion of large number of people and then decide the next course of action.

So, this is the like generally that survey and questionnaire tool is the one of the research technique through which any information can be authenticated; like certain kind of population is ready to ready for that particular design or something. In this way the

survey and questionnaire is the is a one of the tool which is frequently used in ergonomic assessment, and for that some of the percentile calculation is required and that we do with the help of the percentile calculation as well as taking out mean and standard deviation and plotting in a normal distribution curve. So, that we can we could specify the certain kind of population is fitting in that particular domain. So, in that way that analysis used to be performed.

(Refer Slide Time: 16:56)
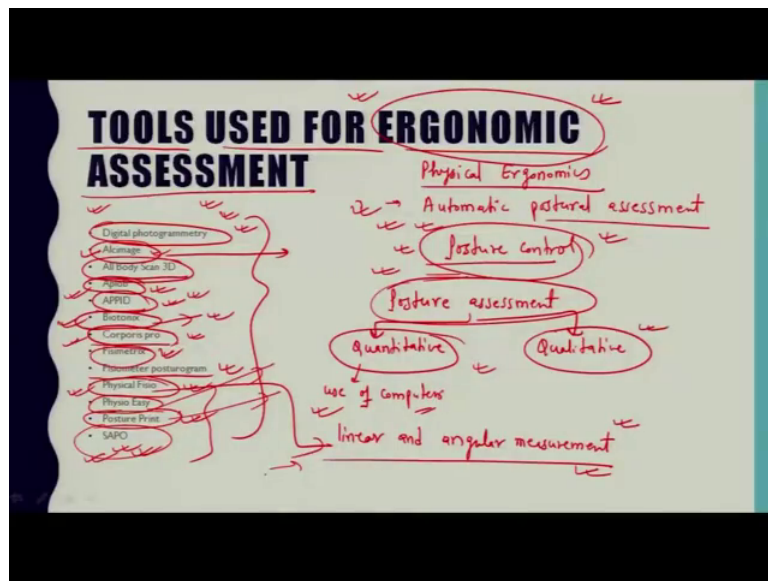
Now we come to understand what all the existing tools explode so far For Ergonomic Assessment. So, ergonomic as a as we have understood the definition, it is a very broad topic. So, broad topics in the sense that it not only includes the physical analysis as well as it also include the environmental analysis and cognitive analysis. So, a lot of topics that this particular world is carrying so here although I have named I have tried to collect it these all tools and equipments just to make ourselves aware that these are the tools already existing and that are being frequently used by users. So, these are the market tools and equipments that is used for several purposes. So, we will just have a have a look over their functioning and for what purpose they are being used in the current scenario.

Now as far as tools and equipment used in physical ergonomic is concerned. So, like if we talk about physical ergonomics. So, here the one thing that comes in mind is that automatic postural assessment and here in this the posture control assessment is the main

focus, because everybody sits and that is no and everybody sits and because of sitting for a prolong period of time everybody faces some kind of some kind of pain is stress or fatigue. So, the there is a very much scope in this particular area like postural analysis. So, that is that is coming in the physical ergonomic portion. So, this particular postural posture control mainly focuses on the orientation of body in order to achieve a proper balance.

Generally it has been found that this Posture Control is an is an phenomena that generally it does not require attention and people use to follow a normal comfortable position in which they initially feel very comfortable position and they feel very comfort in that particular situation. So, the posture of an controlled requires attention that varies from task on the basis of balance and age. Basically a many posture of an individual reflects the daily lifestyle. So, efforts are made to recognize early postural problems and this particular posture assessment can be done in 2 ways; the posture assessment can be done in Quantitative basis and Qualitative basis. So, this qualitative assessment is used less expensive whereas, this quantitative assessment requires use of computers.

As reliability of such method is a still to be enhanced. So, thus know as such standardization used to verify certain posture changes and studies on the reliability of posture assessment is still not sufficient. Basically this posture assessment in ergonomic area is performed with the help of recording and interpretation of photographic images, we what we used to do in ergonomic that we take images and then we perform the analysis on the basis of your posture condition. So, in that series this particular Digital a photogrammetry is used for this particular postural assessment and it is a simple and highly precise technique for recording and capturing postural transformation.

Another kind of tool is Alcimage this alcimage is developed by a physiotherapist that tool is for quantifying the posture precisely based on image capture. So, it also this Alcimage also assess to express disfunction through angle calculation through standardized protocol. So, it basically this Alcimage transform the image dots to the cartesian coordinate axis and evaluate them, the another kind of a tool is all bodies can 3 D. So, this particular software tool it is concenter body in very few seconds and creates a model. So, in that all body scan 3 D a sensor is utilized to model the patient body and in 3 D and transferring the data to the software in computers.

Another kind of tool as this APLOB; APLOB this particular APLOB is utilized for again this postural assessment and one computer is required to utilize this APLOB. So, another kind of tool is APPID this particular software provides information about the posture of individuals. So, it has assessment stages the assessment of posture on Sagittal plane and assessment of posture on the Frontal plane. So, in biomechanics we will cover there are certain planes through which this particular body is defined and based on the view through which we are observing the body we define that plane.

So, the front view a side view or the lateral views. So, all the views we defined on the basis of planes those planes are this Sagittal plane and frontal plane. So, this particular tool this software tool APPID a double PID is used to assess a posture on various planes. In the similar way another software is Biotonix. So, this Biotonix is used in a static posture assessment and balance. So, here the type of accessory is involved in this Biotonix are video camera positioning platform personal computer and computer program. So, in the at this balancing of a particular human body as well as analysis of posture assessment is performed with the help of this particular Biotonix.

Another tool is Corporis pro so it is major plan is basically the performance of posture assessment of patient and the related motion analysis. So, it makes it possible to capture images from different sources to process them by a means of large set of tools so in this way this Corporis pro as doing the posture assessment of medical patient. And the another is Fisiometrix. So, this fisiometrix is generally with the help of this particular software performance of orthopedic postural evaluation can be carried out. So, it helps in and documentation on postural abnormalities, this particular Fisiometer Posturogram what it does it provides a computerized assistance to physiotherapist and related specialized of read area. So, it basically this Posturogram as the name suggests that it uses several photos in the straight positions with the help of digital camera of very high megapixel.

So, with the help of those 6 or several photos that any function or any posture related analysis is carried out, another tool is physical Fisio it consists of posture evaluation software with the several phases like evaluation of flexibility and posture and measurement of perimeters whole body composition analysis. So, in that this Physical Fisio performs it is function and Physio easy is also there posture print is there and SAPO is there. So, these are having they are slightly distinct methodology in order to

perform this postural assessment. So, this SAPO is basically based on the scanning and enables sundry functions like image calibration use of zoom free may a marking of points, measurement of distances and body angles with the assessment either a standardized or specifically directed by any professional ergonomist.

So, in this way this particular this posture print; posture print what it does it automatically identifies and prescribes exact posture for a particular entity and this Physio easy is used for linear and angular measurement. So, it also perform a linear and angular measurement this Physical Fisio in addition to lots of other secondary tool. So, each object measured in the images can be simply moved or edited and the software can consist of any healthcare provisioned to put together clinical decisions because of it is easy use.

In this way these are the several software tools which are used in the in the domain of physical ergonomics an emphasizely on the postural assessment. So, now, we will understand about the existing measuring tools used in ergonomic assessment.

(Refer Slide Time: 29:37)
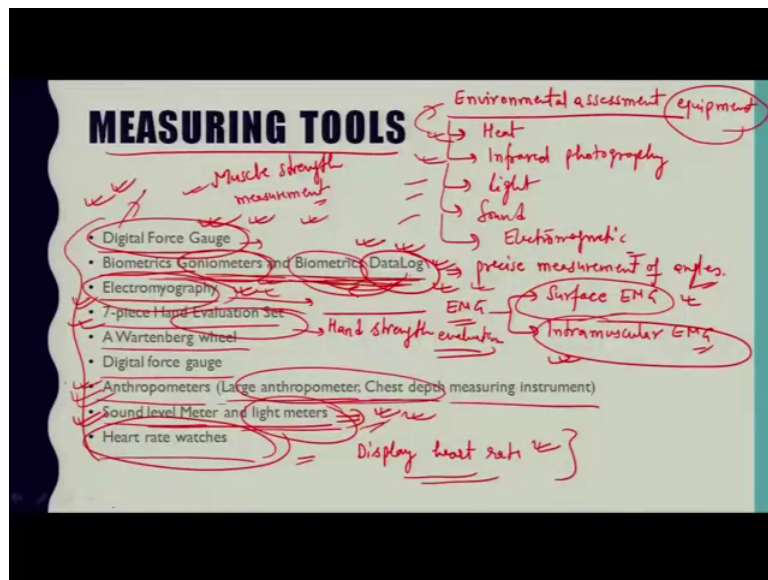
Basically there are various tools and equipment have been developed they are a very they are having very distinct use; like the some of the equipment that I have listed down here like Digital Force Gauge, Biometrics Goniometers and Biometrics Data Log, Electromyography, 7-piece Hand Evaluation Set, A Wartenberg wheel, Digital force

gauge, Anthropometers like Large anthropometer, Chest depth measuring instrument, Sound level Meter light meter, Heart rate watches etcetera.

Generally it is not limited to these categories there are 1000 of tools have been developed in order to access in order to analyze particular case, whether case of any ergonomic area whether it may physical cognitive organizational or psychological or anatomical. So, these are the areas so just to make you aware of existing tools and how they are giving support in the ergonomic research. So, environmental assessment equipment are basically have been developed. So, this measuring tool can be can also be categorized in one category like the equipment used for environment environmental assessment.

So, this may be to equipment which is used to check the ambient, the heat, infrared photography so this may be better we can take as assessment equipment; so Infrared photography, for light assessment, for sound assessment and electromagnetic tools. So, these are the possible areas through which this environmental assessment can take place and there are several equipment have been designed in order to check the performance and productivity assessment. So, here is the digital force gauge this particular as the name is suggesting that it is a force gauge with digital display.

So, that are capable of either force or both force and torque measurement some varieties can even be coupled with the other test apparatus that applies force. So, here it is application it is application like the application of digital force gauge in ergonomics, can be muscle strength measurement, it can be used for muscle strength measurement, functional capability evaluation etcetera. So, functional capacity evaluation is the evaluation of a person's health to see to see whether he or she is capable to meet a particular physical demand or not. So, just to check a strength whether he or she will be capable of performing a particular physical task. So, in that digital force gauge may have important place in assessing the physical aspect.

So, another tool is biometric Goniometer and Biometrics DataLog. So, it basically Goniometers are instruments that are used to check the size measurement of angles it is used for precise measurement of angles. So, this Biometrics Goniometer are sensors based instruments developed by this biometric limited for the dynamics movement analysis of human body part that is if you like if you want to check the range of motion of lims. So, Data Log is a portable device that is to be connected to these Goniometers to

wirelessly. So, let us say the Bluetooth or any module wireless module that can be used. So, here Bluetooth is doing what is do is sending the data to computer or stored the data in for further evaluation purpose.

So, this Biometrics analysis software can be used for Electromyography analysis also. So, using the data also called with Goniometer. So, another thing is this electromyography. So, this particular tool that is Electromyography comes under nerve conditioner studies. So, it is a technique used to evaluate and record the electrical activity by skeletal muscles, this EMG electromyography is also a written as EMG. So, this EMG are of 2 types first is Surface EMG and second is Intramuscular EMG. So, this surface EMG is a is a process of evaluating the muscle activity with 2 electrodes placed above the skin, this intramuscular EMG requires and need an electrode to be appears into the muscle.

So, this electromyography find it is application ergonomic that it can be used to analyze a muscle strain occurred during the work and also this can be used for work design purposes. So, this electromyography is a very important tool in a physical ergonomic. Another tool is a 7 piece hand evaluation set. So, it is nothing but the several setup equipments for hand strength evaluation this 7 piece hand evaluation set is used for hand strength evaluation in that.

(Refer Slide Time: 37:09)
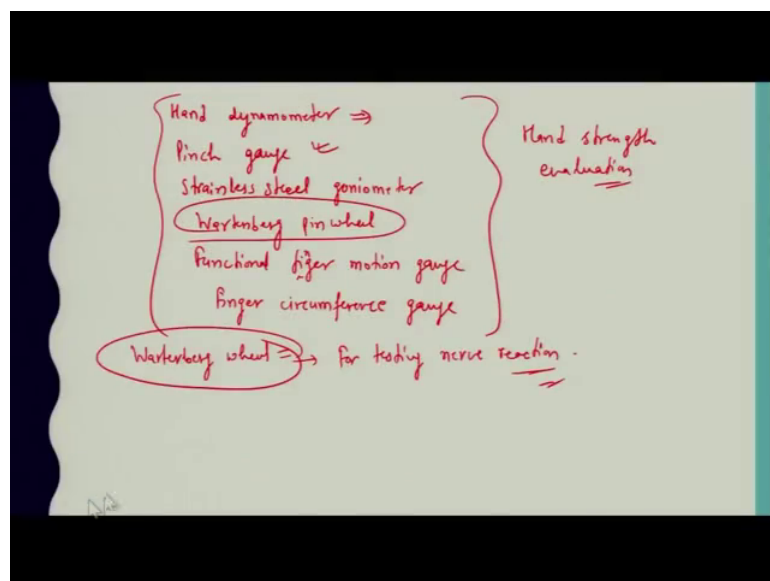
So, basically those a handset hand strength evaluation maybe Hand dyrano dynamometer it can assess the grip strength there is another tool that is Pinch gauge, it is to assess the pinch strength, a Stainless steel goniometer, Wartenberg pinwheel, Functional finger motion gauge; finger motion gauge, finger circumference gauge.

So, these are the (Refer Time: 38:13) consisting of 7 equipments for hand strength evaluation, this wartenberg wheel is a wheel with pin like teeth for testing a nerve reaction it is used for testing nerve reactions. So, this was all about the possible measuring tools and; obviously, this anthropometer are nothing but these are the tools for a study of human body and it is movement and other measuring dimensions. So, basically if you go to the tailor who is a measuring your dimension for designing your cloth. So, he is having a lot of tools. So, those tools maybe those tools come in the category of this anthropometers.

So, animation meant if we taking with some tools that those tools can come in this anthropometers, as far as sound level meters and light meters are concerned. So, these instruments measure the sound level and in any a manufacturing facility this can be used to monitor whether sound levels are within limits or not this light meter is used to measure the intensity of the light. Similar instruments for the measurement of air conditions are also called as Psychrometer kit. So, this psychrometer kit is also used in industries and other region where air conditioning monitoring has to take place. So, in this way these sound levels and light meters have been developed for those reasons this is another kind of and tool ergonomic tool is heart rate watches. So, this is nothing but variable a rest watch kind of instrument that display your heart rate.

Heart rate so this can be used in work designed to assess the heart rate variation in workers during the execution of strenuous works.

(Refer Slide Time: 40:57)
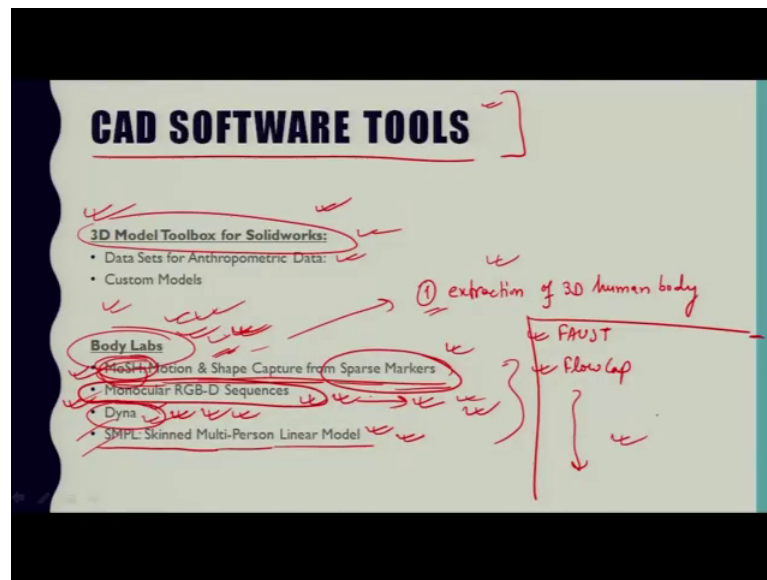
So, these were the summary of several tools existing in this particular ergonomic market so now, the next heading we are going to learn about is there are existing cad software tools for ergonomic assessment. So, this may be 3 D Model Toolbox for Solid works; in that Data Sets for Anthropometric Data and we can also Custom the Model. So, I basically this cad softwares in order to understand the human body 3 D images are essential to analyze.

It is essential to analyze your actual body condition. So, there are various a 3 D models softwares have been developed and those a 3 D human body models can do simple ergonomic fitting task that might be difficult using traditional approaches. So, the various computer designing softwares have been developed and the human body model come in many forms like 2 D a drafting bold templates mannequins, 3 D physical dummies which you can found, which you can find in markets malls where the clothes have been you go for purchasing clothes. So, various dummies that gives you at the proper view of a fitting that particular cloth so that 3 D physical dummies are available. So, these are the physical tools that have been developed that have been developed. So, in that series there are other software tools also those software tools are body labs 3 D model toolbox for solid works.

So, this basically this toolbox is just to put the anthropometric validation tools and this body lab is also is a particular software, basically it is a cad software for anthropometric

analysis. So, what it does it this body lab collects digitizes and organization all of the data and information related to human body, it the information maybe of it is shape various poses and motion. So, they what they do they said their goal to transform the human body into digital platform upon and around which goods and services can be designed produced bought and sold.

So, this particular body lab software is extract the 3 D human body by using artificial what it does it extract extraction of 3 D human body and it is 10 by just by using artificial intelligent tools to extract the 3 D human body from different sources. So, those maybe those methods maybe MoSH that is Motion and Shape Capture from Sparse Markers. So, here sparse markers are used in human body to capture shape and a shape and a postures of different part of the body with respect to time. So, this motion and shape capture from sparse markers detects the marker position and create a 3 D human body. So, this particular MoSH is able to capture the Nonrigid motion of soft tissues.

In this particular due to it is more accurate for finding exact shape and position of the body it is used many places like preparing animation movie and all for this MoSH is very much beneficial; like there is another way to develop the various body structures or body is body features in a 3 D there is another method is monocular RGB-D sequences in this particular sequences the strategy. So, this 3 D geometries and human model human body model is generally can be estimated from this particular Monocular RGB-D Sequence.

So, D sequence can be found by using any inexpensive RGB-D sensors by allowing a human to move freely in front of that sensor. So, arrange data in each frame is align with multi resolution 3 D body model and the technique then uses geometry and the picture at texture over time to acquire precise size and shape and appearance data in spite of unconstrained moments. So, in this way these are the methods which body lab company which provide these are software tools used to perform his human body modelling.

Another model of a dynamic human shape in motion is Dyna. So, it gives the accurate design of human body with real human sensitivity. So, the particularly this particular Dyna gives uses several 3 D scanners for performing it is 3 D human modelling .There is another SMPL the full form is Skinned Multi-Person Linear Model. So, what it does it speaks to a wide variety of body shapes in common human postures. So, different parameter of model can derive from shape weight and posture of the body. So, the like

similarly apart from this MoSH monocular Dyna and SMPL there are many other methods which derive from body labs, this can be listed here like FAUST this is the data set and evaluation for 3 D MoSH registration and flow cap this is the 2 D human workpost for optical flow and many other methods are there like informed sampler open D R. So, these are the methods which can be used for this human modelling and other related analysis.

(Refer Slide Time: 48:36)
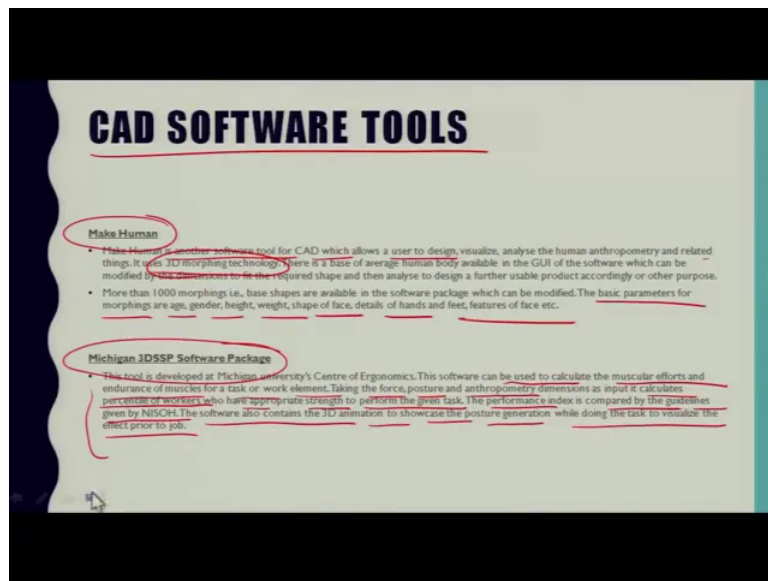
So, this particular topic under this topics cad software tool as a software, which is freely available as a make human. So, this particular make human has a software tool for cad which allows a user to design visualize analyze the human anthropometry and related things. So, it uses 3 D morphing technology. So, this particular the basic parameter for morphings are age gender height weight shape of face details of hands feet and feature of the face another software package is michigan 3 DSSP software package.

So, this basically does what this is this software can be used to calculate the muscular efforts and endurance of muscles for a task or work element taking the force posture and anthropometry dimensions as input it calculates percentile of workers who have appropriate strength to perform the given task performance index is compared by the guidelines given by NISOH the software also contains the 3 D animation to showcase the posture generation while doing the task to visualize the effect prior to job.

So, these are the softwares just to have awareness of a current existing tool for designing as well as analysis of various aspects of ergonomic ergonomics.

(Refer Slide Time: 50:11)
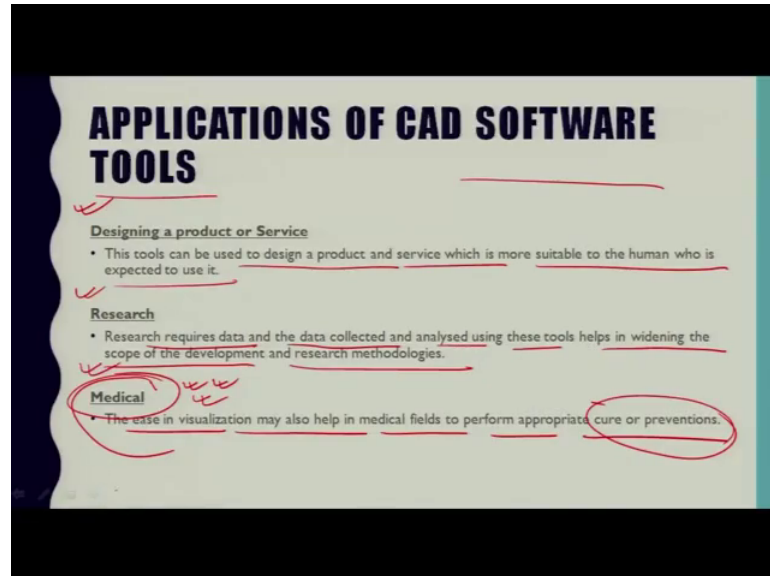
So, what are the possible application of cad software tools. So, it is used for designing a product or service. So, that it is used to design a product and service which is more suitable to the human who is expected to use it, this particular these particular cad software tools is also used for research. So, Research requires data and the data collected and analyzed using these tools helps in widening the scope of the development and research methodologies as we human being as a like is a mortal. So, he use to get some disease when the misuse of the body happens.

So, the medical domain is a very necessary for curing that particular disease which has been which particular person suffers. So, for medical purpose this cad software tools are also being utilized. So, ease in visualization help in medical fields to perform appropriate cure or preventions. So, cure and preventions are needed for human body and for that purpose this cad software tools are also giving some sort of support to medical domain.
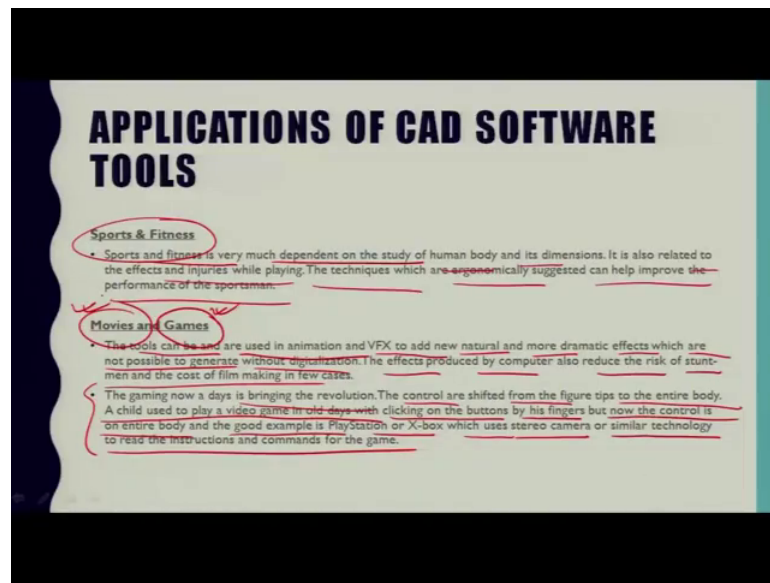
Another area apart from research and medical this Sports and fitness this is also possible application of those cad software tools. So, those sports and fitness is very much dependent on the study of the human body and it is dimensions. So, it is also related to the effects of injuries while playing the techniques which are ergonomically suggested can help improve the performance of a sportsman.

Movies and games tools can be and are used in animation and VFX to add new natural and more dramatic effects which are not possible to generate without digitalization. The effects produced by computer also reduce the risk of stuntmen and the cost of film making in few cases. The gaming now a days is bringing the revolution. The control are shifted from the figure tips to the entire body a child used to play a video game in old days with clicking on the buttons by his fingers, but now the control his on entire body and good example is play station and X-box which use stereo camera or similar technology to read the instructions and commands for the game. So, this particular area of game and movies that cad software tools are finding utility.
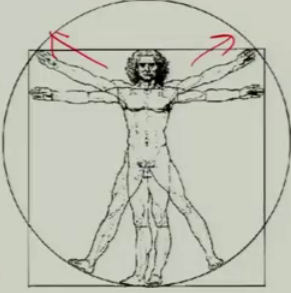
(Refer Slide Time: 53:22)
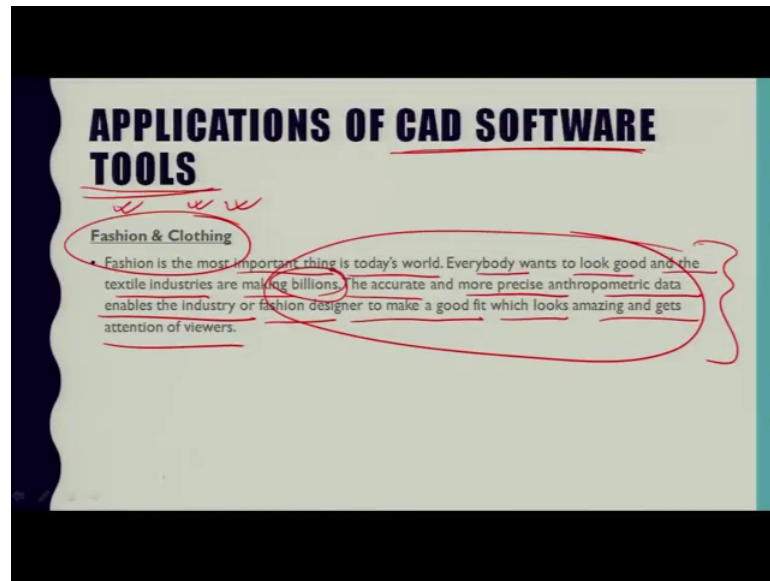
Another area where these cad software tools are finding utility is fashion and clothing. So, the fashion is most important thing is today's world. Everybody wants to look good and the textile industries are making billions, the accurate and more precise anthropometric data enables industry or fashion designers to make a good fit which looks amazing and gets attention of viewers. So, now, a day's people are running in this category. So, this cad software tools are giving lot of help in designing clothes and as well as to make a good fit in order to have a proper attention of viewers. So, that is solve for this particular topic which was about tools and techniques used for ergonomic assessment and other possible ergonomic area.

(Refer Slide Time: 54:32)

So, before that just have a fact that do you know that your body measurement equal each other this was given by Leonardo da Vinci. So, you are probably familiar with Leonardo da Vincis famous sketch the Vitruvian Man. So, it is one of the earliest and best exploration of anthropometry, or scientific study of the measurements and proportion of the human body. As we mentioned your foot will fit neatly into your forearm, from elbow to wrist, but did you know. That your height basically equals to the span of your arms when you stretch them out to the side.

Your height is also roughly 10 times the length from your wrist to the tip of your middle finger and about 7 times the length of your foot. This kind of anthropometric correlation is not just fun to know, an anthropologist might use it to determine how tall the owner of a particular bone was and a forensic scientist might use a footprint or a handprint to estimate the height of a criminal.
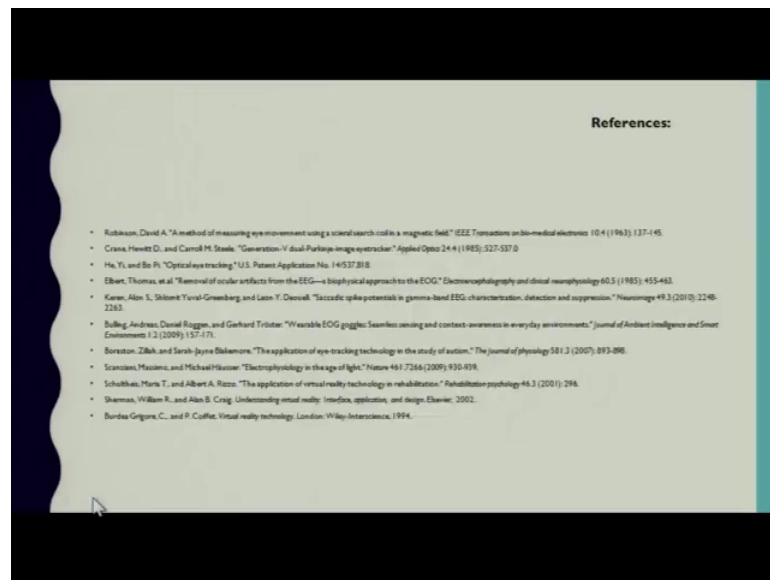
(Refer Slide Time: 55:54)
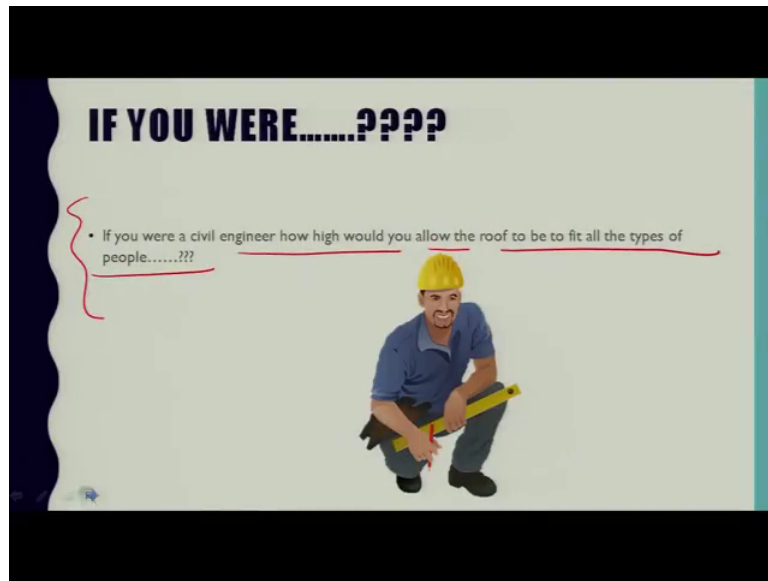
If you were a civil engineer how high would you allow the roof to be fit all type of people?

(Refer Slide Time: 56:06)

His is anthropometric question see graffiti for you enjoy it by seeing it.

(Refer Slide Time: 56:11)

These are the references possible references that I have from where I have collected these data of cad software tools and other tools and techniques used for ergonomic assessment that is all for now.

Thank you.