Industrial Engineering
Prof. D. K. Dwivedi
Department of Mechanical and Industrial Engineering
Indian Institute of Technology, Roorkee

Module - 03
Lecture - 13
PMT System and Standard Data Method

For setting the performance a standard for a job in organizations, work measurement is frequently carried out, which also helps in investigating the presence of ineffective time and it is extent. The work measurement is carried out by various techniques and these are the work sampling time, study predetermined motion time method and the standard data method. In the first two methods, like the work sampling and the time study, the study is carried out by the work study man by actually visiting to the shop floor and having the observations of the things being done by the worker.

Here, in time study, the continuous observations are required, to identify the time required to carry out the job and investigate the presence of ineffective time, if it is there. While in case of work sampling, a random observations are carried out at a randomized intervals, so that the percentage of occurrence of particular activity, whether it is action or inaction on the part of the machine or the man can be obtained; but work sampling is comparatively simpler, as compared to that of the time study.

There are other two techniques, like the standard data method and the predetermined motion time, study method in which, the time study men and the work study men, actually does not visit to the shop floor, for establishing the time required to carry out a particular job. Here, no actually site visits are required to be done by the work study men, but in this method, the work study men basically uses the basic human motions, which are required to carry out the job.

The time required for performing the basic human motions, have been established, over a period of time and in this connection, various systems have been developed and corresponding to those systems. Actually in each of those systems, the time values for different types of the basic human motions have been identified under the different working conditions. So, these time values for basic human motions are used, in both these methods, these are the PMTS method and the standard data method. In these

methods, actually it is not required for the work study men to visit to the shop floor and record the things what is being done by the worker or the machine.

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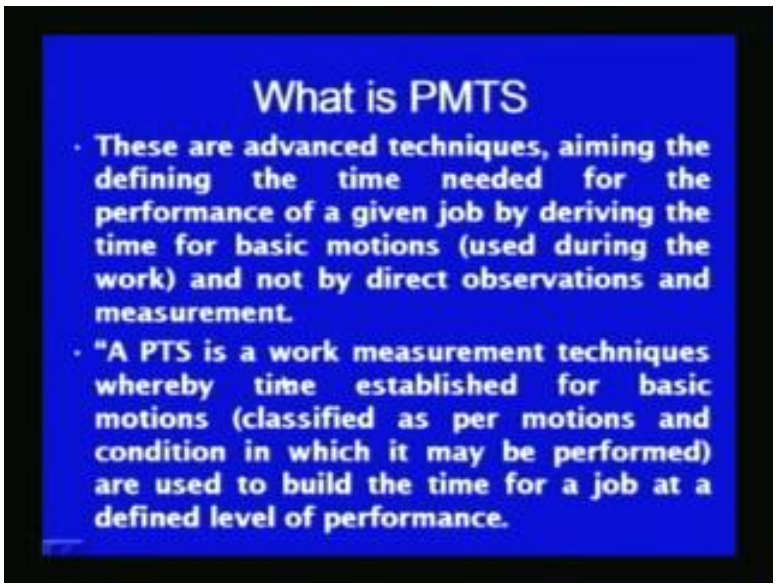

These are considered as a advanced techniques of the work measurement, which basically aims at defining the time needed for carrying out the job, by deriving the time values required for performing the basic human motions during the job. And these time values are not obtained by the direct observations and the measurement, but these time values are taken from the handbooks, which have been developed over a long period of time.

A PTS, is defined as a work measurement technique, whereby the time is established for, time established for basic motions is used to build up the time required for a job at a defined level of performance. So, these basic motions have been defined and categorize in different way, in the different PTS systems which have developed.

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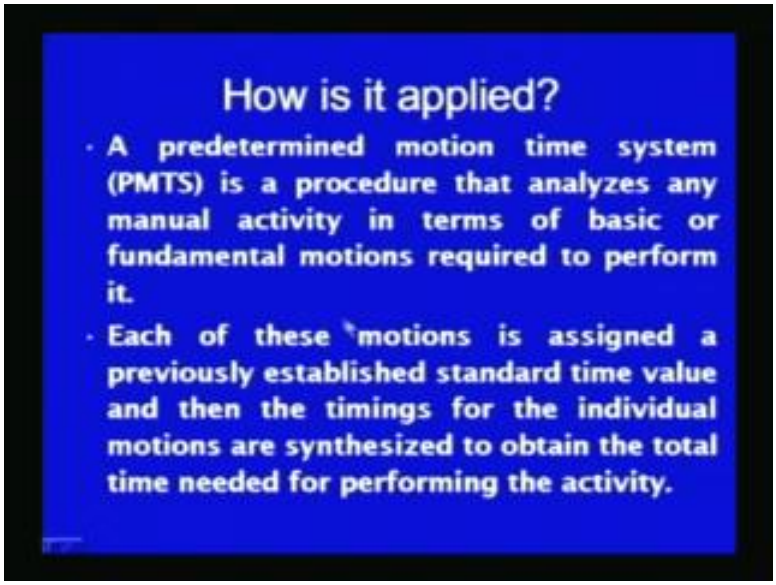

For applying the PTS systems, the given job which is to be analyzed and for which time is to be obtained is broken down, in to the number of the basic human motions; so that the time required values for those basic human motions can be obtained from the data banks and the PTS systems. A predetermined motion time system, is a procedure that analyzes any manual activity in terms of the basic or the fundamental motions required to perform the job.

Each of these motions is assigned, a previously established standard time value and then the timing for the individual motions are synthesized, to obtain the total time needed for performing the activity. So, here simple basic human motions are used, to quantify the time required to carry out the job and the time for the basic human motions, have been established over a period of time. So, predetermined time values, for the basic human motions are basically used, to synthesize the time required for performing the activity. And this typical feature of the PTS system is very important, because it helps to come up with the time required for carrying out the job before, actually it is performed by the worker.

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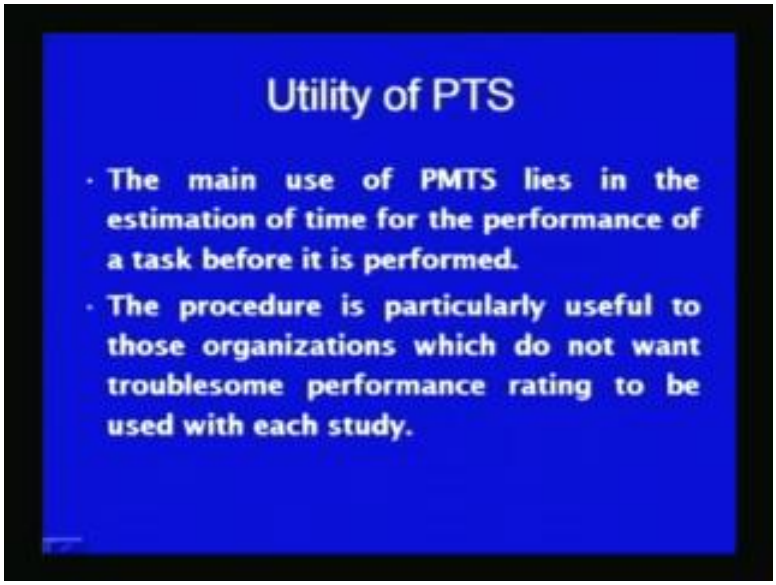

This is the main use of and therefore, main use of PMTS system lies in estimation of the time for performance of the job before it is actually performed. So here, in this method because, the method which is actually is to be followed for it is, for producing a particular component is broken down in the data sheet or in the record sheet. And the basic, in terms of the basic human motions required for performing the job and then time values for those basic human motions are obtained from the predetermined the time values, from the data bank.

And a some of those, time values are used to estimate the time for performing a task, before it is actually done. This is of great importance and it offers wide range of the applications, this procedure is particularly useful to those organizations, who do not want the troublesome performance rating to be used by the time study. In the time study particularly, the subjectivity associated with the performance rating of the worker, during the time study is not found to be very favorable point for those organizations, where the time study is criticized very frequently. And in view of the very positive points associated with the PMTS, and these are very extensively used in variety of applications, like setting the time standard for a job.

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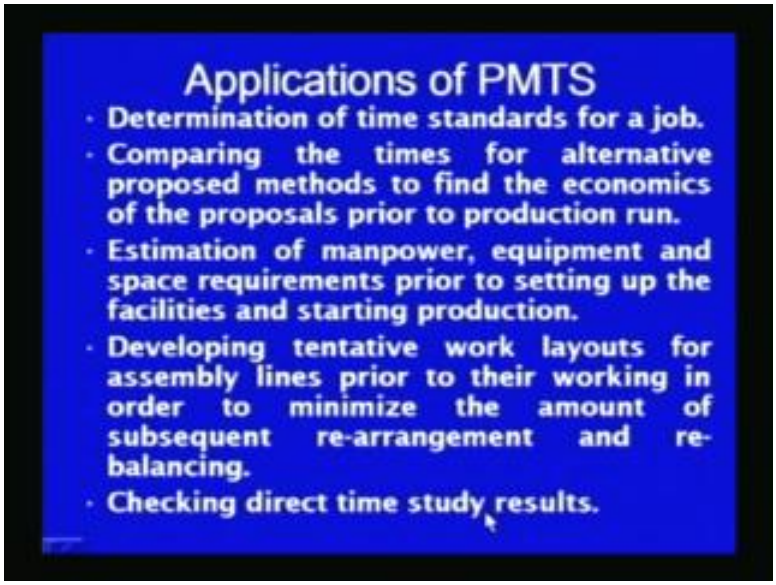

The time standard can be set, by identifying the different motions, which are required for carrying out the job and summing up the time required for performing and each motion, helps to come up with the time required for doing a particular job. It also helps to compare, the time required for carrying out a given job through the different alternative methods which are being proposed. So, before actually using the proposed methods, we are able to know the time which will be required, by the each method.

And this helps, in selection of the optimum method, even before it is tested, so the comparing the time values for alternative proposed methods helps to find the economics of the proposals prior to the production run. Estimation of manpower, equipment space requirement prior to the setting up of the facility and starting the production, is also possible, because we are able to know, that how much time each product will take in manufacturing before actually manufacturing starts.

That helps in establishing the manpower required and the equipment capacity which will be required and accordingly the space requirement, for a given volume of the production. So, before actually starting the production, we are able to estimate the requirements related with manpower equipment and the space related features. Developing the tentative work layouts for assembly line, prior to their working in order to minimize the amount of subsequent re-arrangement and the re-balancing.

In manufacturing industry, a large movement of the man, material and machines takes place, right from the handling of the raw material to the handling of the material, during

the manufacturing and during the dispatch and finally sending it to the different markets. So, here if extensive movement of the man material and machines are taking place during the manufacturing, then that movement is largely decided, by the way by which equipments and different departments and machines has been arranged.

So, that is termed as layout, if the layout has been arranged in such a way, that this will take minimum time for completing a given task or for achieving the desired level of production, then that would be beneficial. So, in initial stages if we are planning to have one type of the layout, then how much time it will take to complete the production and if you are having the another type of the layout, then how much time it will take, so that can be easily estimated with the PMTS method.

And thereby, it helps in developing the tentative work layouts, so that the time required for a given production or for the movement of the man material and machine in course of production can be minimized and which will subsequently reduce, the possible rearrangements and the rebalancing required for a smooth production and checking the direct time study results, this method is also used to crosscheck the results of the time study, which have been established by the direct observation.

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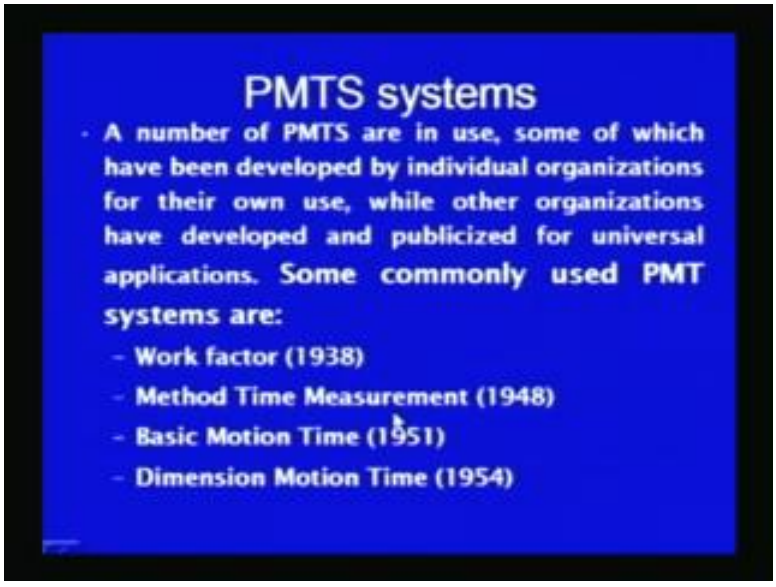

In the PMTS system, the problem is, that the number of systems are there and one of the system is to be selected, so we need an expert person, who can use a particular PMTS system and analyze the job which is to be studied, by breaking down in to the basic human motions. So, a number of PMTS systems are there in use, some of which have

been developed by the individual organizations for their own use, while other organizations are developed and publicized for the universal application.

Some of the PMT systems are work factor, developed in 1938, the method time measurement system, developed in 1948 and the basic motion time system in 1951 and the dimension motion time system, developed in 1954. So, in this presentation I will be talking about the first two PMTS system slightly in detail, just to understand in which way these methods can be used to find out the time required for carrying out the job.

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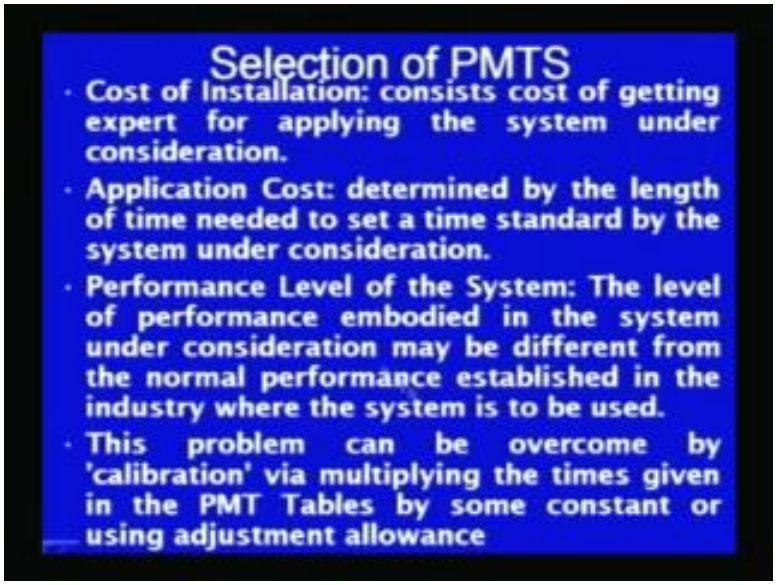

The selection of, a particular PMTS system depends upon the cost, the cost is very important factor, that how much time can be spent and how much time, how much investment can be made to establish the time for a given activity with desired accuracy for a particular job. So, the cost of installation consists, cost of getting the expert for applying the system under consideration and application cost is of course there, which determined by, the length of the time needed to set a time standard by the system under consideration.

So, how long given set time standard will be used, that is also important, if it is going to be for, going to be there for a short period and it is better, not to be carried out by this method. The performance level of the system is another area which needs attention, the level of performance embodied in the system under consideration, maybe different from the normal performance established in the industry, where system is to be used.

And to go with this, the difference in performance of the job which is being done in particular organization and the performance corresponding to which, data has been developed in PTS system. So, here this problem can be overcome by calibration via multiplying, by multiplying the times given in PMT table by some constant factor or by using adjustment allowance.

So, some factor is to be used, which is to be multiplied with the time values, to accommodate this adjustment, to accommodate this difference in the performance level, which is there in particular organization and the performance corresponding to which the data has been developed. In addition to the application and the cost related aspects, the consistency of the standard is also kept in mind.

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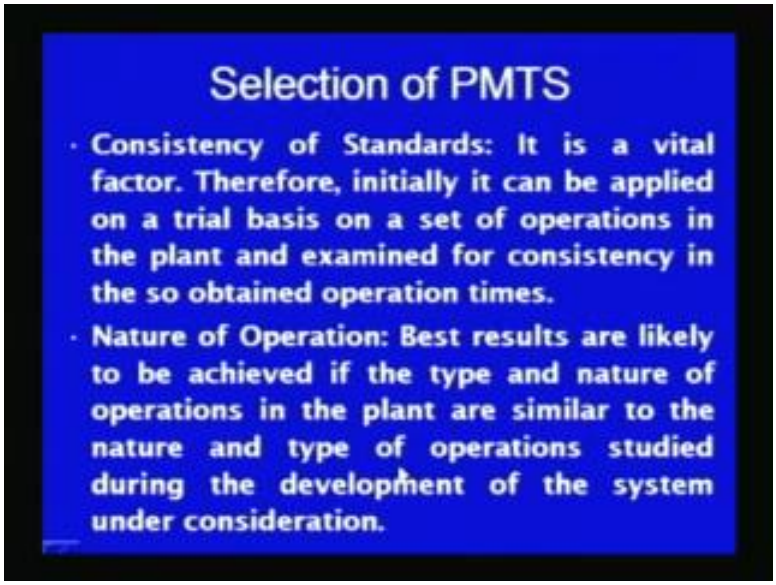

It is a vital factor, therefore initially it can be applied on a trial basis, on a set of operations in which, in the plant and they are examined for consistency, so that the data obtained and the time values are matching and does not give the erroneous results. The nature of operation is also important, the best results are likely to be achieved, if the type and nature of the operation in the plant, are similar to the nature and the type of operations, studied during the development of the system under consideration.

So, if there is similarity in the data, for data, for which it has been developed and for which it is being applied, then there will be very close relationship and there will be largely correctness in the time values which will be obtained, otherwise it may give some variation also. So, the nature of very operation is important, that the time values for

which the data has been developed for set of operations are used for the similar kind of operations only.

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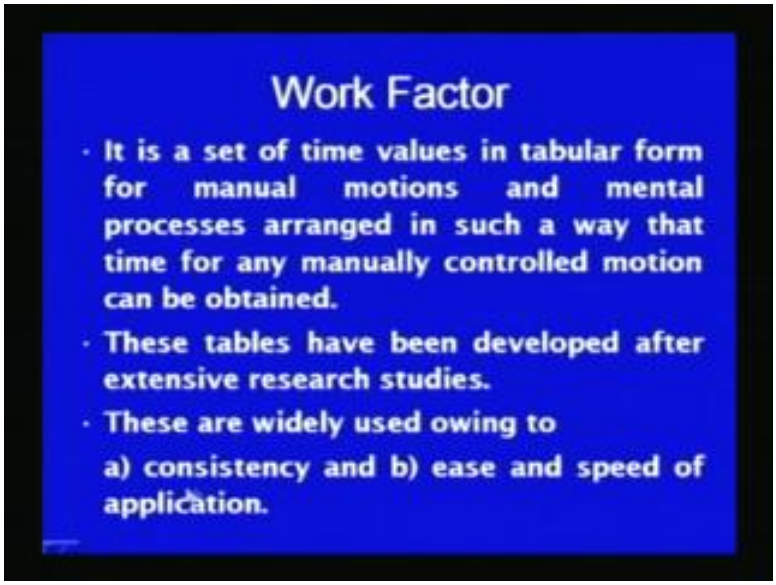

Work factor is the one PTS system, in which the time values are given in tabular form for manual motions and the mental processes arranged in such a way, that the time for any manually controlled motion can be obtained. Work factor is a one, predetermined motion time system, in which time values for the different manual and mental processes have been given and these time values are obtained as per needs and these where developed after extensive research. And these are widely used owing to due to the consistency related with the time values and the ease and speed with which, this method can be applied.

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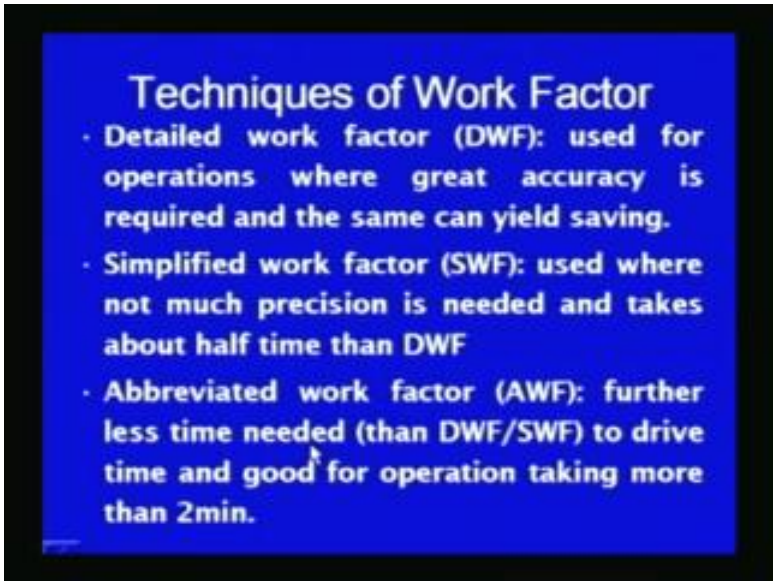

In work factor method, there are various types of the work factors, like the detailed work factor is used for the situations, where great accuracy is desired and if the increased accuracy required is obtained in the time values, that is going to yield some saving, then this detailed work factor should be used, this gives very accurate time values and if that time values, those time values are important from the saving point of view, then this method should be applied.

But it is very time consuming and it is very costly, because it looks in very detail of the various aspects, with operation. The simplified work factor, used where not much precision is needed and takes about half the time than the detailed work factor method. Abbreviated work factor method is another work factor method, where, which further takes less time, which further less time takes to develop the time required to carry out the job and to, and it is good, it is found to be good for those operations which are of the time more than 2 minutes.

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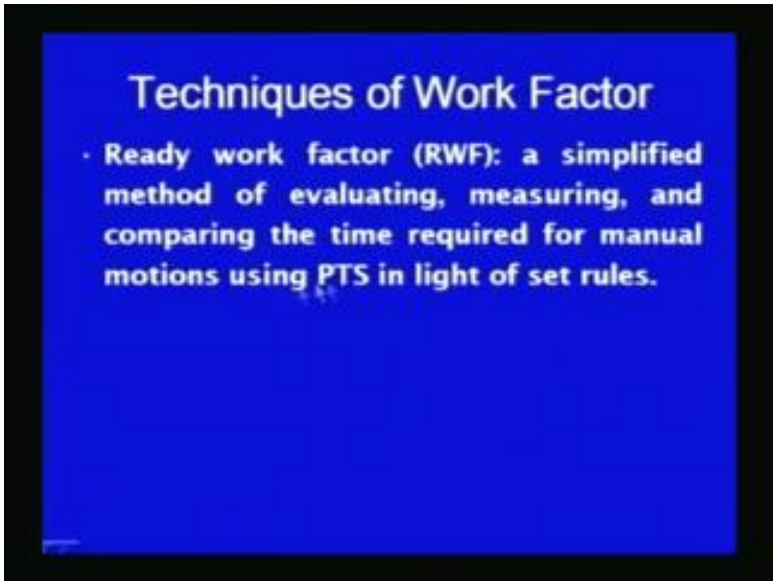

The ready work factor, RWF is a simplified method of evaluating, measuring and comparing the time required for manual motions using the PTS, in light of the set rule.

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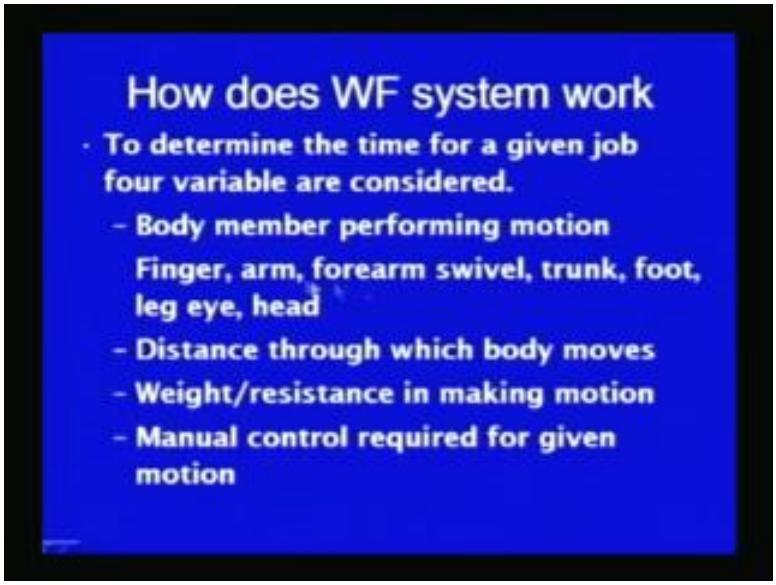

So, for determining the time required for carrying out the job using the work factor system method, there are four variables which are considered and so that, the time required for the job can be arrived. These, four factors are the body members which are being used for carrying out the motion and that the distances which will be traveled by the body part, while the motions are carried out and the resistance which will be offered,

in care performing those motions, resistance which will be experienced by the body parts in performing those motions is also considered.

And the extent of manual control required in performing those motions, is also taken in to account, so the any job, is analyzed by the work factor system, in terms of the four variables, form the part of the work and these are, the way by which body parts are being used, body parts in use maybe the finger, arm, forearm, trunk, foot, leg, eyes and head and the distance through which body travels is also taken in to account.

And the resistance in terms of the weight or any other term the, like the force required for performing the motion, is also taken in to account and the kind of precision required or the difficultly which maybe there in performing a particular motion is also taken in to account and the job is analyzed, in terms of these four factors and the time values are obtained, accordingly. For measuring the distance through which the body part will be moving, while motion is being performed, the different points are used as a reference.

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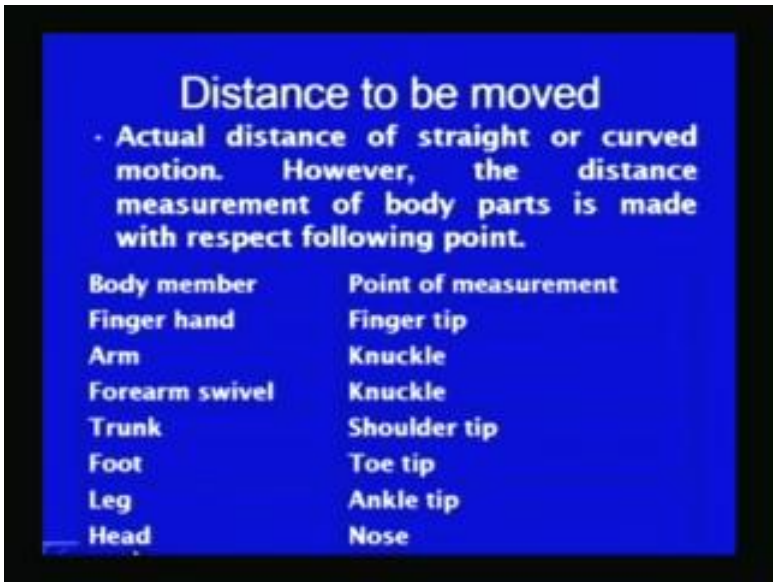

The actually distance, of the straight or curved motion is to measured, with respect to the certain reference points. However, the distance of measurement of the body part is made, with certain specific reference point for the different body parts. Like, here this list, the body parts, these are the body parts and these are the reference points, with respect to which measurement should be made regarding the movement of the body parts.

Like finger, hand finger is to distance traveled by the finger of the hand should be measured with respect to the finger tip and the ankle, sorry arm movement should be

measured with respect to the knuckle. And likewise, the foot movement should be measured with respect to the location of the toe tip, and here the head movement is measured with respect to the position of the nose.

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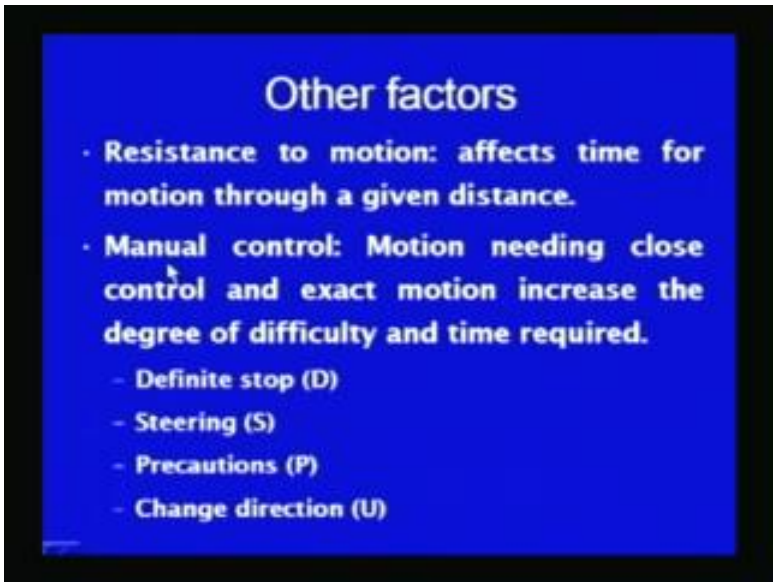

Other factors which are, with respect to which job is analyzed or the resistance to the motion, which because it affects the time required for performing the motion through a given distance. And the manual control which is required, manual control required also affects the time required for performing the motion, motion needing the close control and exact motion, increases the degree of difficulty and the time required.

For example, definite stop, continuous control, required for a steering and the precautions which are required and the change in direction, in very specific manner. So, these are the conditions, which will be indicating the kind of control required, for performing the motion. Increase in degree of difficulty for performing the motion, increase will be the time required for carrying out those motions. So, using these four factors, the job for which time standards are, time standard is to be set.

The job is analyzed and the time values are obtained from the standard table and after the analysis of the job, in respect of the body member used, distance moved, work factor involved and the resistance for the motion, the time values are obtained. The work factor in the job, maybe in form of the transport, the grasp, release, preposition, assemble, use, dissemble or mental process.

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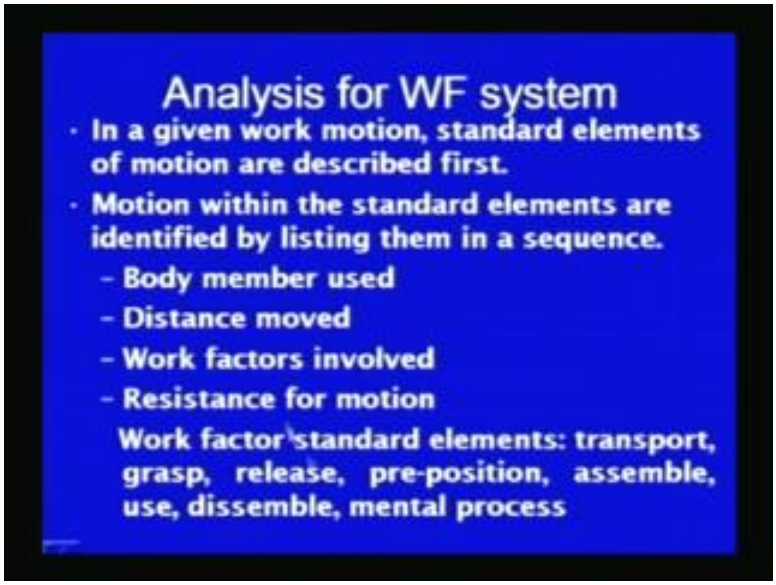

So, according to the use of the body member, distance travelled, involvement of the work factor and the resistance for carrying out the motions, the time values are obtained.

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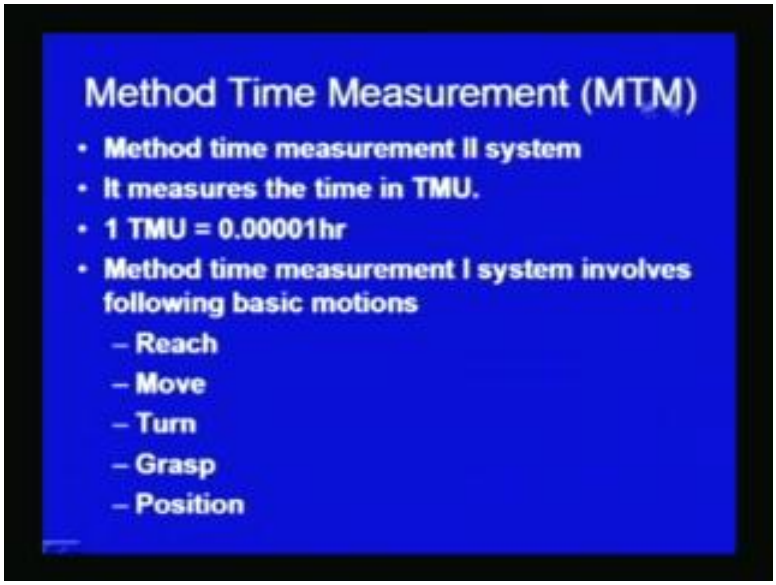

To find out the total time required for carrying out the job, by work factor method, the method time measurement system, in short it is known as MTM method, is a another PTS system or predetermined motion time system. In the method time measurement, the many method time measurement systems have been developed like 1, 2, 3. Here, I will be talking about mainly the PMTS second, that is method time measurement II system, it measures the time in TMU unit and 1 TMU unit is given as equal to 0.00001 hour.

The method time measurement I basically involves, the following motions for the analysis and arrive at the time required for the job, these are reach, move, turn, grasp and the position. Reach is about the that moving the hand towards the job which is to be picked up and move is about moving the job after picking it up and getting control over it. Turn is about the movement or in the circular path, grasp is about getting the control of the object, in hand and position is about putting the things in one particular position.

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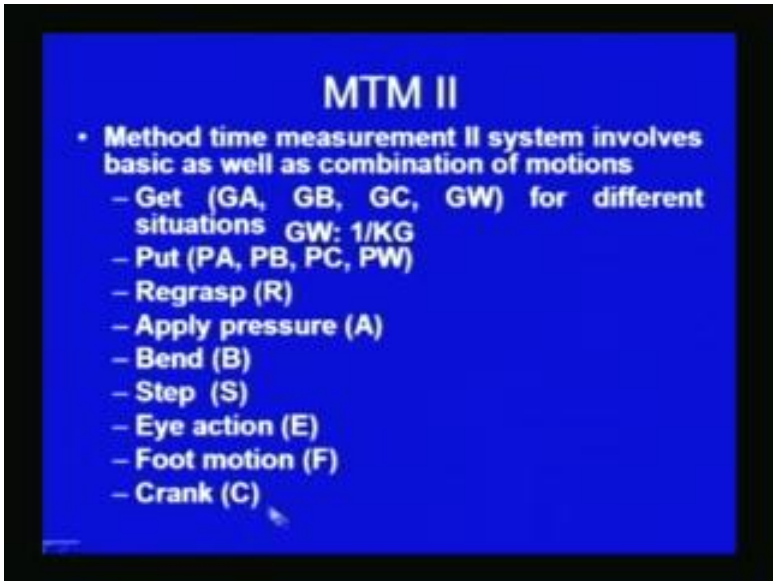

In MTM II, the method time measurement system involves the basic motions, as described in MTM I and the combination of the motions also. Here, it involves the basic motions like get, get is about, that getting the control over the object for the different conditions the get is characterized as a G A, G B, G C or G W. If the weight is to be handled, then G W is used and depending upon the degree of difficulty to get, the G A, G B or G C categories are used.

The put is the another basic motion, which is, which depending upon the degree of difficulty, in putting the things in, putting the things, we categorize P A, P B, P C and P W is for putting the weight. Regrasp is about changing the position of grasp in, of the hand in on the object and is represented by R and apply pressure is about exciting the force on the object ((Refer Time: 26:50)) so hand indicated by A and the bending is about moving forward and the bending in downward direction represented by the letter B.

And a step is about moving the foot greater than 30 meters, so that the 30 centimeter, so that the trunk and the head also goes forward, while eye action is about looking from one position, by changing the excess of vision from one position to another and foot motion is about moving the leg, for a distance less than 30 centimeter and without changing the body position, crank is about moving the body along the circular path, more than half of a revolution, so these are the motions which are used in MTM II.

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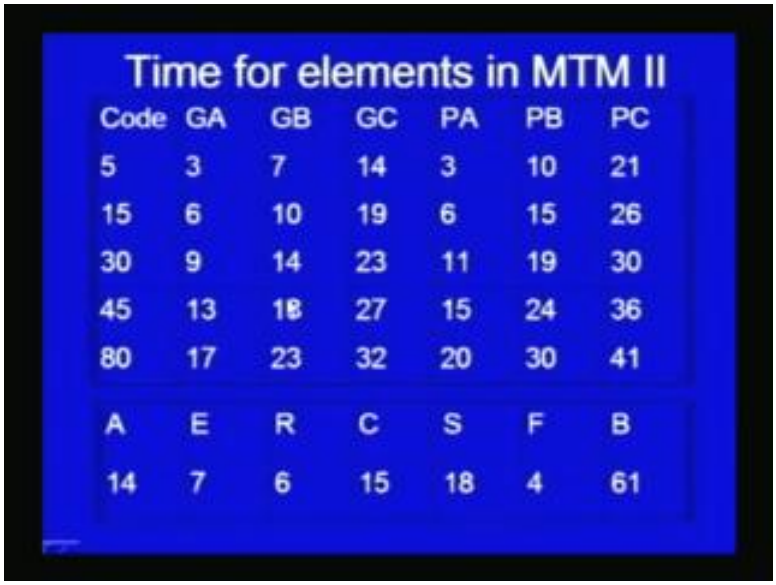

So, if you have to incorporate the distances, which are being travelled by the body part, in performing the different motions like get A, get B, get C and PA, put A, put B and put C category, A, B, C indicates the increasing degree of the difficulty. Similarly, G A, G B, G C indicates the increasing degree of difficulty of the get, similarly here, increasing degree of difficulty for put and the codes are indicated for the different distances which are being travelled.

Like say 5, code 5 is used, if the distance to be tremendous 0 to 5 centimeter by a particular body part. If the distance to be travelled is 5 to 15 centimeter, then it is indicated by a code 15, if it is in the range of 15 to 30 centimeter, it is given code of 30 and for a distance, to be traveled by the hand while performing the get or the put, through a distance of 30 to 45 centimeter, code 45 is given and similarly for a the distance more than 45 and up to 80, here it is given 80 code.

And if we see here, these values indicates the time required for performing the get A is 3 TMU, for the distances to be travelled less than 5 centimeter. Performing the get, under

the B conditions which are slightly difficult, the time required is 7 TMU, for distances to be travelled less than 5 centimeter and so, if we see, here the increasing degree of difficulty, increasing the time required for performing the motion for the same distance.

But for a given degree of difficulty, if we take increase distances, increase in distance of the travel by the body part for one particular category of the get, that is GB, we can see that increase in distance increases the time required for performing those motions. In the same way, we can see here for the put basic motion, here it indicates, that the increasing degree of difficulty, time is increasing from 3 TMU to 21 TMU and increasing distance also indicates, that the time required for, put of A category indicates the increasing time required.

Here A, E, R, C, S, F and B, these are other basic motions which are allotted the time values in TMU unit. So, here A stands for apply pressure and the time allotted is 14 TMU for eye action, that is changing the axis of vision from one location to another, it is allotted 7 TMU units and R and C, C is the crank, crank about rotating along the circular path more than half of a revolution, 15 TMU, S is step and B for band 61 TMU time is allotted. So, likewise the foot motion, 4 TMU time is allotted, these are not related to weight.

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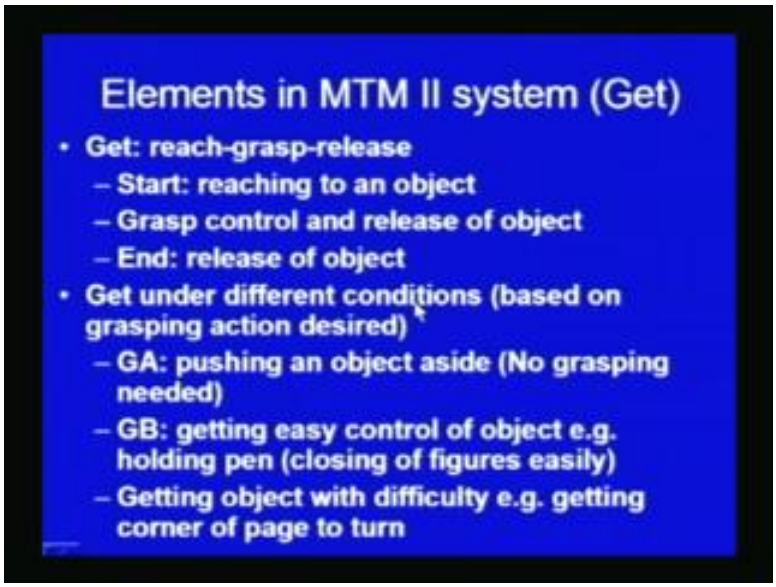

Here, we will go in detail, how to divide and analyze the job in to the basic motions, the get involves the reach, grasp and release, the get means reaching of the hand from one position towards the object, get grasping the object and releasing it. So, get starts with

reach of reaching to an object and grasp, getting the control and release of the object and it get ends with the release of object.

Get, under different conditions, based on the grasping action desired is categorized as G A for case, simply pushing an object in one side, pushing aside an object leads to the G A, which does not require any control, so no grasping it is it needs, while in case of G B, getting easy control of the object, say holding a pen by closing the fingers, this control is easy, but it is somewhat difficultly compared to just pushing an object to one side.

Getting the object with difficultly, like getting the corner of the page to turn it, is grouped under the G C. In this case, degree of difficulty will be maximum and that is, why time required in TMU we allotted is also found to be maximum.

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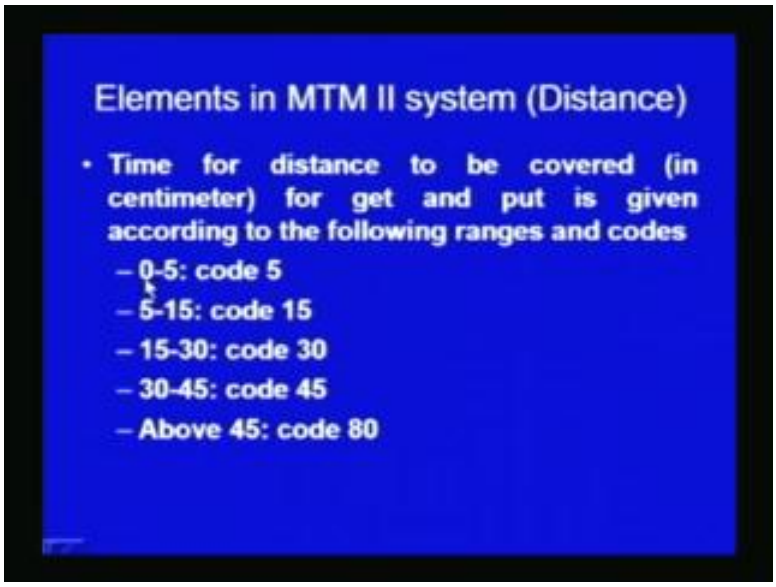

If the put and get motions are to be performed through a different distances, then the different codes which are to be used for the analysis purpose, are like this, where 0 to 5 centimeter distance is to be covered, then 5 code 5 is used and for the distance, say 30 to 45 centimeter is to be covered, then code 45 is used and above 45 centimeters code 80 is used.

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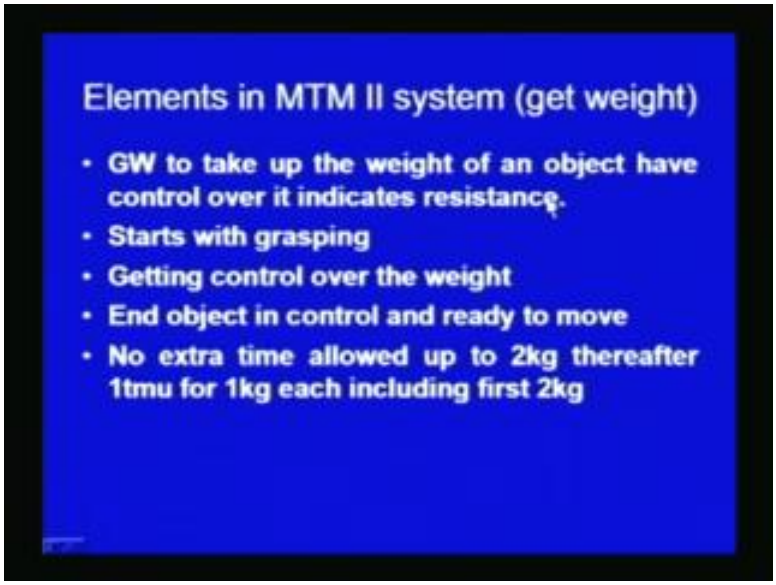

Another element is G W, which is related with the grasp weight, involves to take up the weight of an object and have control over it, which in turn indicates the resistance in having and the control over it and performing the desired motion and here, it starts with grasping and getting control over it and ends object in control and ready to move. So, getting weight is about the grasping and getting control over it and so that, it can be made, it is ready to move.

No extra time is allowed for G W element, up to 2 kg, but with the further increase in weight, 1 TMU per kg of the weight is allotted extra, including the first 2 kg of the weight.

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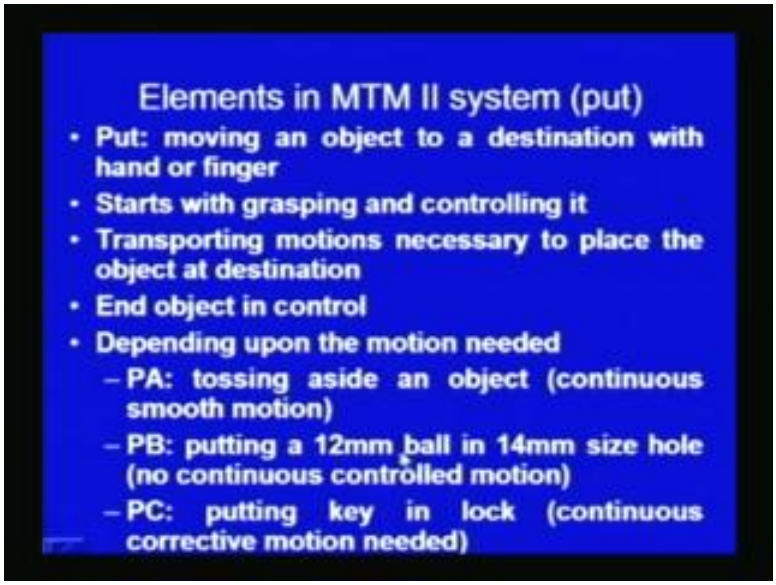

The put is another element, involves moving an object to a destination with hand or finger, it starts with grasping and controlling the object and transporting motions necessary, to place the object at destination and ends the object in control. Depending upon the motion needed P A, P B or P C, put element is classified as a P A, P B or P C, these are in order of increasing difficulty, P A for those cases, where continuously smooth motion is possible like tossing aside an object.

And P B, for those where no continuous control is required, like putting a 12 mm ball in 14 mm size hole, so here somewhat, more difficulty is there in getting the things as per needs and PC is the putting key in lock, where continuous correcting motion is required to do the job.

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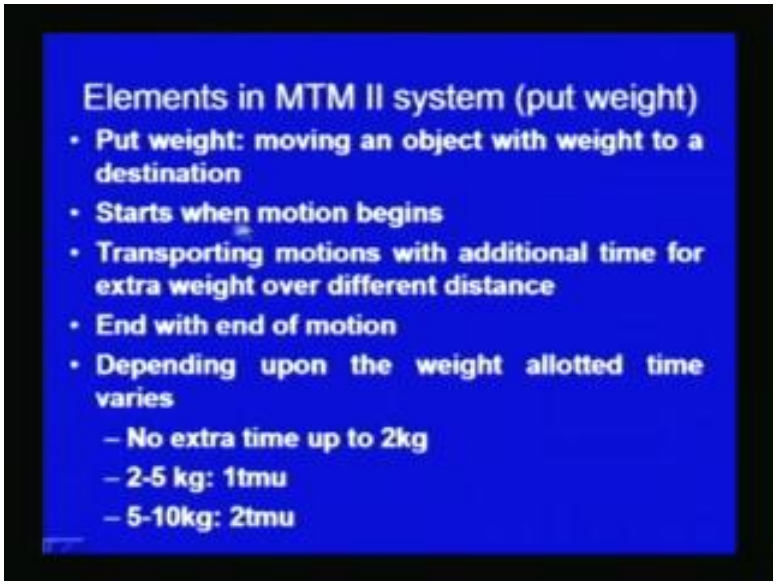

So, put weight involves, moving an object with weight to a destination, starts with the motion begins and transporting motion with additional time, for extra weight over the different distances and end with end of the motion and depending upon the weight allotted time varies, like no extra time is allotted, up to the 2 kg of weight, 2 to 5 kg, 1 tmu time is allotted and 5 to 10 kg 2 tmu time is allotted.

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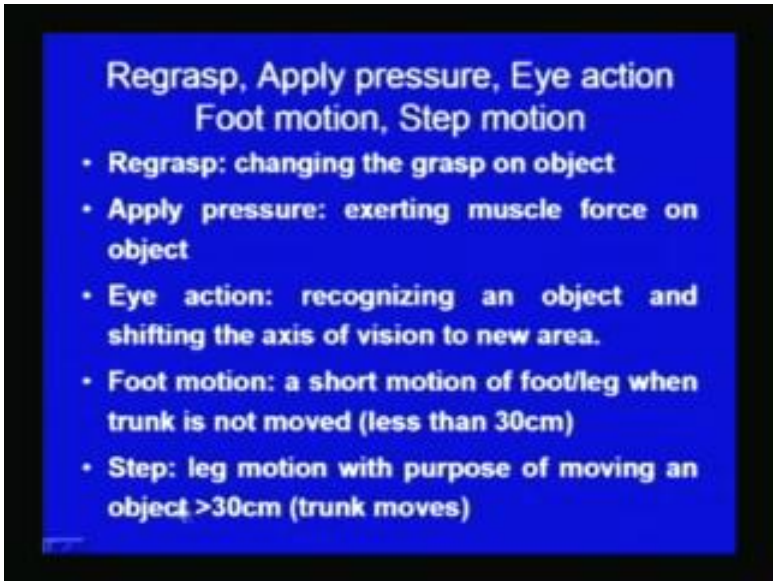

Other elements like regrasp involves basically changing, the grasp on the object and apply pressure is basically exerting muscle force on the object. Eye action is the recognizing an object and shifting the axis of vision to new area and foot motion

involves a short motion of foot or leg, when trunk is not moved and the movement is for less than 30 centimeter, while step is leg motion with a purpose of moving an object or the, or purpose of moving the body greater than 30 centimeter, in this case even trunk moves.

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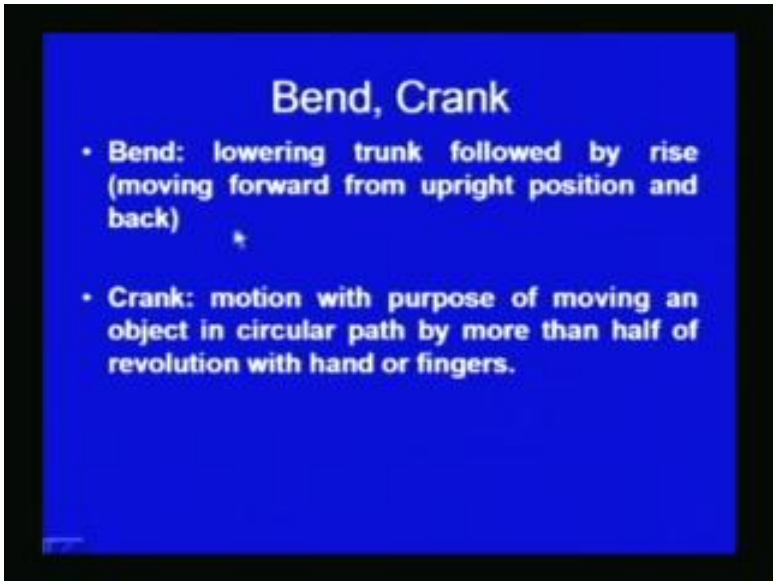

Bend and crank are the two other elements, which are used in the mtm 2, bend involves lowering trunk followed by rise, moving forward from upright position and back. Well, crank involves motion with the purpose of moving an object in circular path by more than half of revolution with hand of finger.

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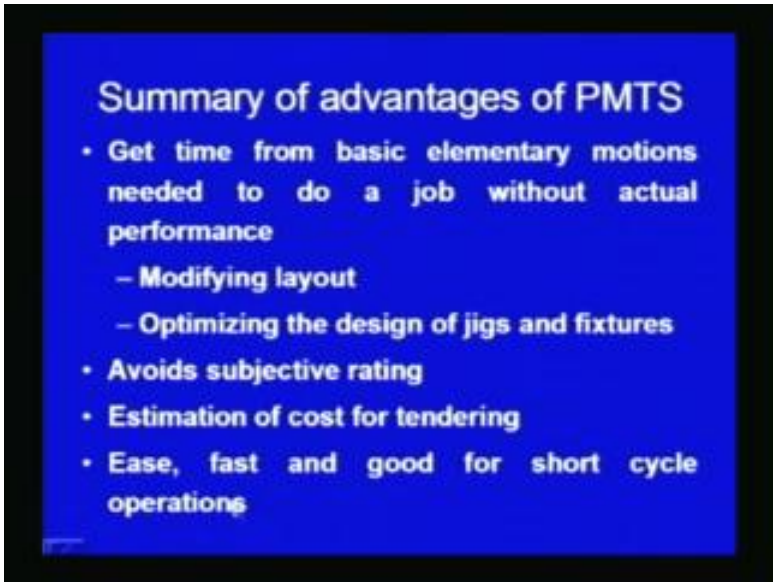

If you have to see, the benefits of the PMTS in view of it is capabilities and especially, the ability to find out the time required for getting out the job, without performing the job. Actually, this feature helps, offers variety of benefits and the advantages, like it helps to get the time from basic elementary motions, to do the job without actually performing, which in turn helps, to modify the layout and optimize the design of the jigs and fixtures, so that the time required for carrying out the job can be reduced.

It avoids the subjective rating, which is normally associate with work sampling and the time study. But here, in this case, the subjective rating is not a part of PMTS system and it is not decided by the judgment of the time study man or the work study man. Estimation of the cost for tendering is also possible on the basis of the time required for carrying out the job, which can be estimated by the PMTS and it is ease, fast and good for the short cycle operations.

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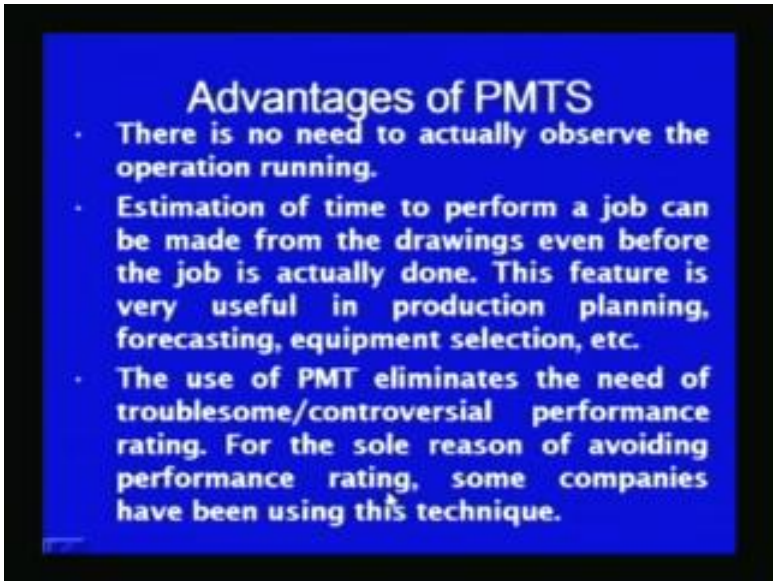

There is no need, actually to observe the operation, when it is being run and estimation of the time to perform a job can be made from the drawing, even before the job is actually done. This feature is very useful in production planning, forecasting, the equipment requirement and selection of the manpower. The use of PMTS eliminates the need for troublesome controversial performance rating of the worker, by the time study man. For the sole reason of avoiding the performance rating, some companies have been using this technique, extensively.

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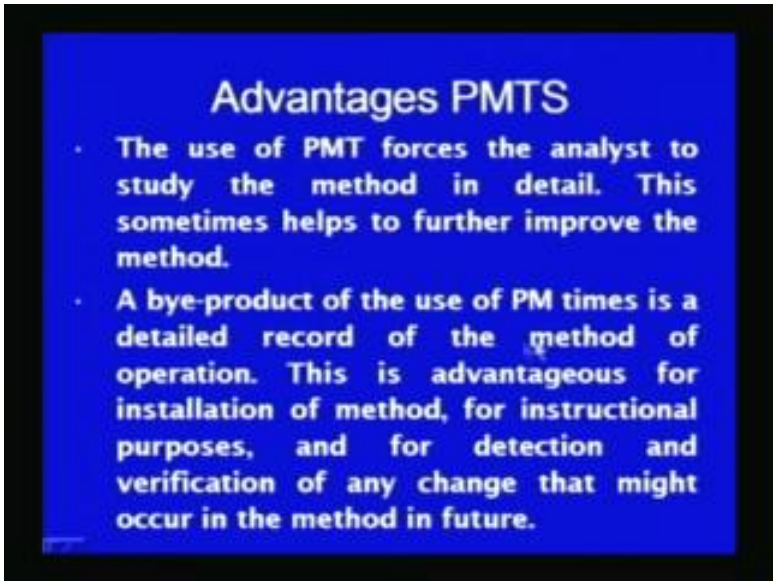

Use of PMT, forces the analyst to study the different aspects of the method, which in turn helps to provide, the venues for improvement of the existing method. When detailed study of the existing method is carried out, that in turn provides the areas, where improvement can be done. A bye-product of use of predetermined motion times, is a detailed record of the method of operation.

And this is advantageous for installation of the method, for developing the instructional details and for detection and verification of any change, that might occur in the method, later on future. So, this is another great advantage of using PMTS, when the detailed breakdown of the job is made available, which helps to check any deviation from the method, which is being used by the operators during the job.

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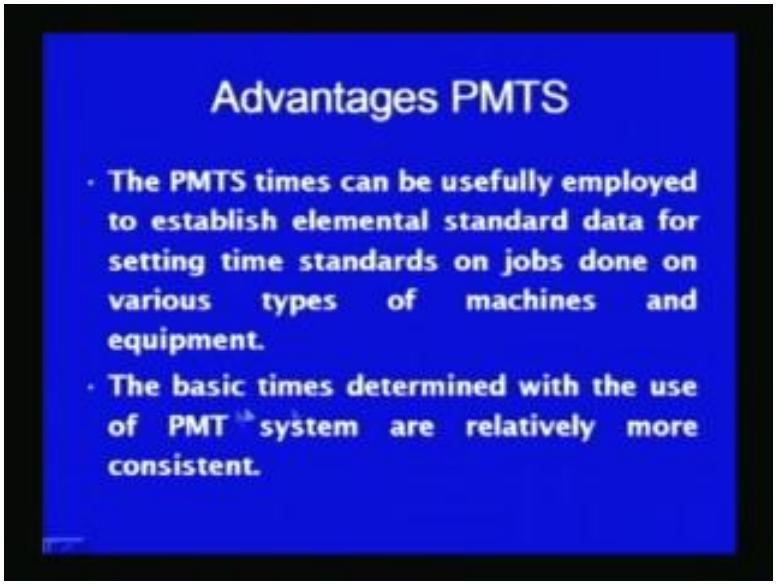

PMTS can also be, usefully employed to establish the elemental time data, values for setting the time standard on the jobs, done on various types of the machines and equipments. The basis time determined with the use of PMT system are relatively more consistent, compared to the time study ratings and the standard of the time, which has been set by the time study method, because the observers made it in the different way to the operator and the operator may also work at a different phase, during the actually working.

So, the consistency will be somewhat low, in case of the study compared to the PMTS method. Here, for a given job, always one value of the time is generally obtained by the PMTS method, that is why it is found to be more consistent, but there are certain limitations are also associated with PMTS method and these are like.

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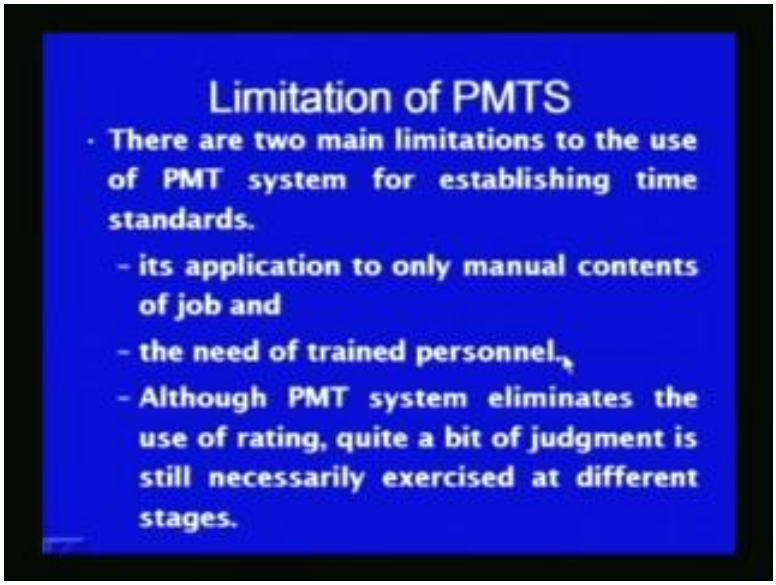

The PMTS method can mainly be applied for the manual jobs and the, it requires the experts for it is application, because fine breaking of the job into the fine fundamental motions are required and for those motions, time values are obtained from the different PTS systems. All the PMT system eliminates the use of rating, but it is, quite a bit of judgment is still necessary exercised at the different stages.

So here, it is not entirely free from the judgment aspects, but it also does not use directly, the rating of the worker like in the time study, but there are some other limitations or drawbacks associated with the PMTS method.

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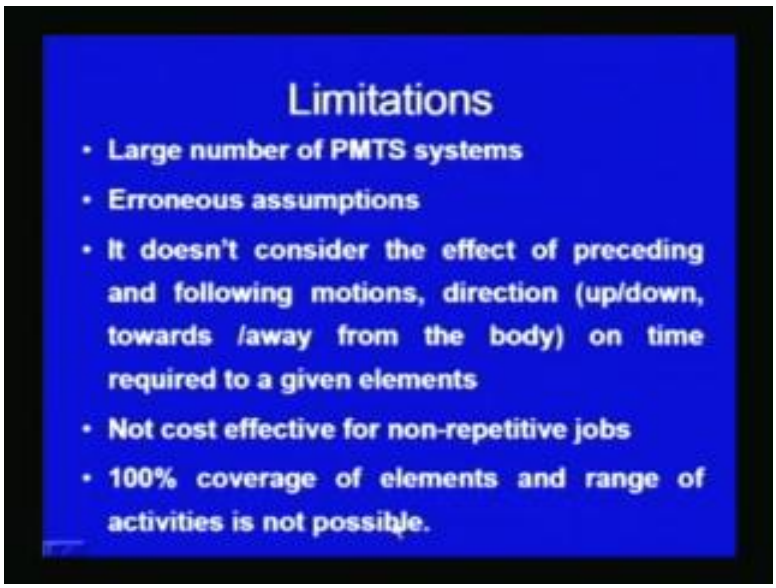

Like, the existence of the large number of PTS systems, makes the people confused about the type of PTS systems, which is to be used for a given case and the availability of the data, related with those PTS system is also another difficult problem, another problem and here, erroneous assumptions are made in PMTS that, all experts will take the same time for completing a given job, by a specified procedure. This assumption is not found to be very correct, because the different operators have the capability to perform the job at the different pace.

So, it cannot be obtained, in the same way, means it cannot be obtained correctly, if this assumption is not found correct. In fact, the assumptions for which the time values have been established, the kind of experts who have been doing the job while establishing the time standard for basic motions and the performance of those experts maybe different, compared to the operators who have been working, actually in the shop floor, for which time values are to be established.

So, this assumption, that the time required for carrying out a one particular job, will be same irrespective of the worker, who will be doing the job, is erroneous related with this PTS system. It does not consider the effect of preceding and following motions and the directions, on the time required for carrying out the job. This is another drawback related with that, it does not consider the motions which will, which have been performed earlier or which will be performed later on.

And the direction of the motion, like moving up and down or moving towards or away from the body. These directions and the preceding and following motions effect, on performing a particular basic motion is not considered in PTS system. In actual practice, the preceding and following motions and the directions, affect the time required for carrying out the basic human motions, during the job, it is not found cost effective for non-repetitive job.

Those jobs which are repeated, hundreds and thousands of the time in a day, those jobs are found to be more suitable for the study by the PTS system. But, if the job is non-repetitive type, it is not good to study by the PTS method and 100 percent coverage of the elements and the range of the activities, which are performed in the organizations are also not covered by the PTS systems, for which time values may not be available.

For example, like waiting time or machine holding time or putting the thing aside, the time values may not be available, because the range of activities which are carried out in

the organizations are so varied in nature. So, of so many varieties that, all those motions and the activities may not be covered by the PTS systems, so the 100 percent coverage of the all elements, which are required for doing of the job, may not be covered in the PTS system, which is being used, to establish the time required. The standard data method is the another method, which is commonly used, for establishing the time required to carry out the job.

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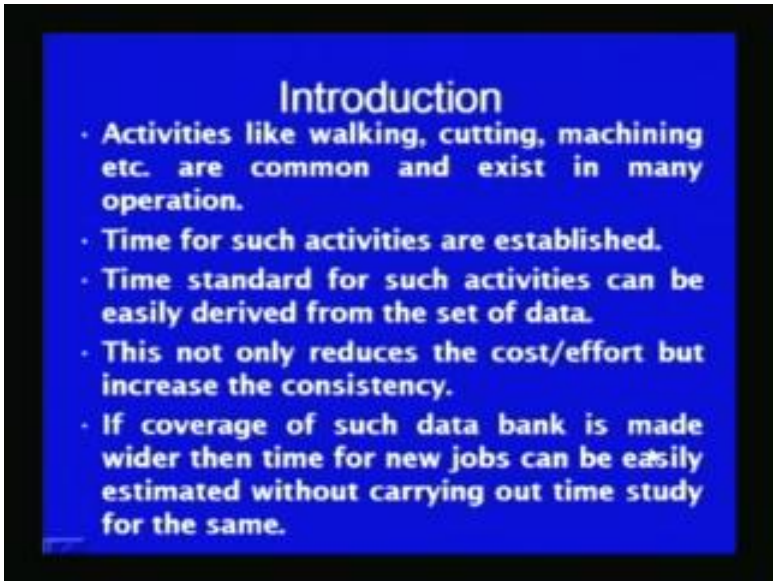

There are various activities, which are very frequently carried out in the industry like walking, cutting, machining and if the time values are available for these simple activities, then the time values required for other operations, in which these activities are carried out, can be obtained from the all ready established time values. So, this is also similar to the PTS except that, here the job is broken down in the different way, to find out the time values.

So, time for such activities are established, through the time study and the time standard for such activities can be easily derived from the set data, this is not, this not only reduces the cost and effort, but also increases the consistency. If the coverage of such data bank is made wider, then the time for new job can be easily estimated without carrying out the time study for the same, but initially the data bank is generated by the time study only.

So, if the data bank has been sufficiently generated, in the large volume for the simple activities, which are very frequently carried out in organization. Then, time for a given

job, which involves those activities can be easily established using the data bank, which has been set after the extensive time studies of the simple activities, which are very frequently carried out in the organization.

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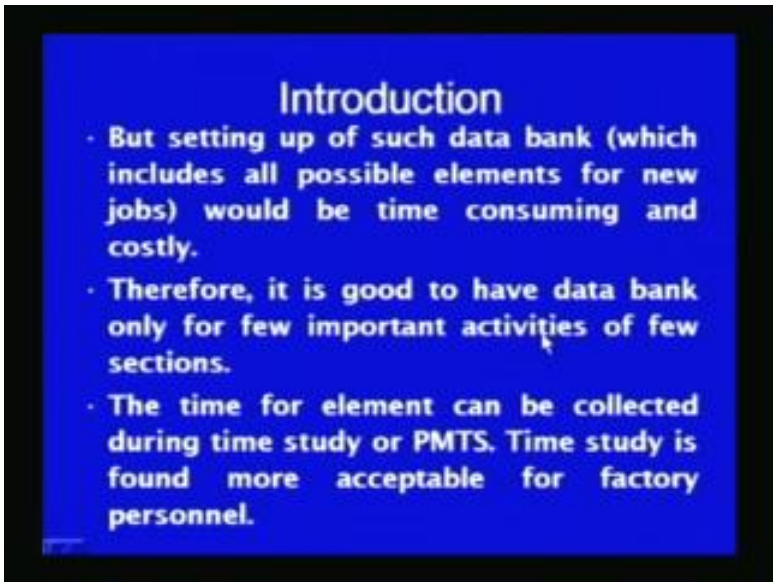

But the setting of the such data bank, which includes all possible elements for the new job, would be very time consuming and costly. Therefore, it is good to have the data bank, only for few important activities, of the few sections which, where very frequently changes take place and the time for element can be collected during the time study, or PMTS method, the time study is found to be more acceptable for the factory personnel.

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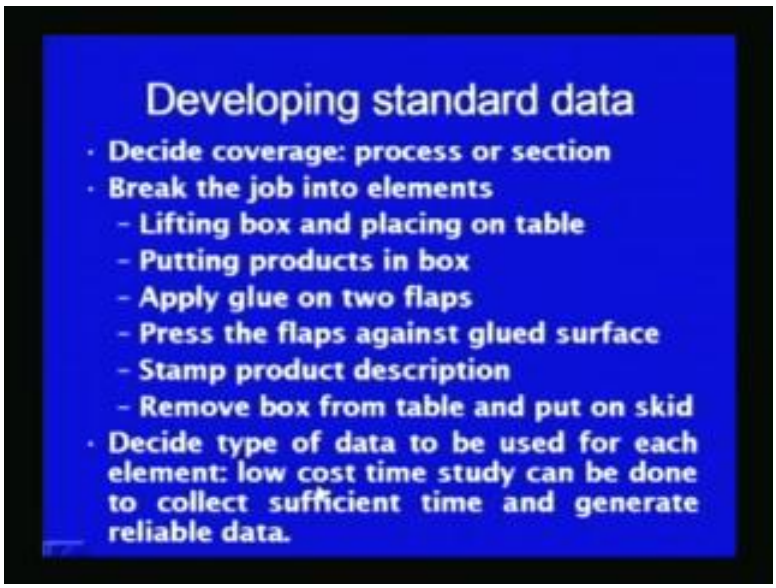

For developing the standard data bank, first of all, the coverage area is decided regarding the process or the section, for which time is to be developed and the standard data bank is to be set. Break the job in to the elements like lifting the box, placing the box on the table, putting product in box, applying glue on the flap, two flaps, press the flap against the glued surface, stamp the product description and remove the box from the table and put on the skid.

Say, one operation of packing and pasting, the level on the box is broken down in these 5, 6 number of the element, then time values for each elements are obtained and which are later on, can be used to find out the time required for performing the similar kind of the operation. On the another packing operation, which may require the different types of the items, which are to be packed or the different size of the flaps, which are to be pasted on the boxes and the stamps are to be put on.

So, the simple job, jobs are broken down in to the small elements and the time values for those are obtained. They decide on the type of the data to be used for each element, the low cost time study can be done to collect the sufficient time and generate the reliable data.

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In this method, the important thing is to note down and to see that, what are the major factors and the minor factors related with the job, that can significantly affect, the time required to carry out the same. For example, restricted walking process, in the restricted walking process, the major variable is the distance which is to be covered, while the

minor variable will be the temperature, humidity, physical built and the lighting. These minor factors can affect the time required for covering the distance, but not to the great extent.

Here, the time which is being affected, mainly by the distance which is to be covered, therefore if you have the time values, for the different distances which are to be covered, then we can derive the time required for a particular distance which is to be covered while doing a particular job.

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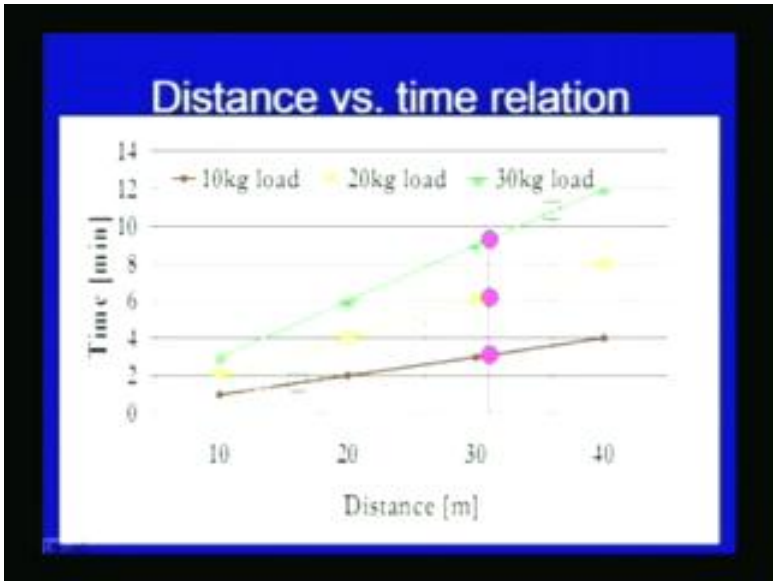

For example, here one person carrying the different weights of 10 kg, 20 kg and 30 kg and he has, he is covering, say distance of 10, 20, 30 and 40 meters. The time required for covering the distance of 10 meter, 20 meter and 30 and 40 meter, with a 10 kg load, can be seen with this red line, while the person moving with different distances with a 20 kg load can be seen with this middle line.

Here, in all these cases, there is a straight line relationship and a, it also can be seen, that with the increase in the load, the time required is also increasing, indicating the resistance, increasing resistance to the movement with the increase in weight. Maximum slope is there with the 30 kg load, person with the 30 kg load, covering the different distances.

So, here if we have to obtain the distance which is to be traveled by a person, carrying a 10 kg load and covering a distance of 15 meter, instead of either 20 or 10 meter, then the time required for the 15 meter can be directly calculated from the straight line

relationship. In the same way, if the person covering a 30 meter distance, with the 10 kg load and he takes, say onetime value, T 1 and say he is taking the another time value, T 3 for 30 kg load.

Then, this relationship may also be linear one and the time, extra time being required for the extra weights, can be calculated for covering the same distance. So, what is the increase in time required, with the increase of load, that can be estimated, so if the time required for covering a given distance, for a person with a different loads, instead of 10, 20 or 30 kg. Say, if he has to cover 25 kg, carry the 25 kg load, then the time required can be calculated from the relationship between the time required for and the increase in load for covering a given distance.

So, here in all these cases, a straight line relationship exist, so depending upon the kind of relationship, which exists between the time value and the variable, which is being investigated. The time values for intermediate parameters and a parametric values can be obtained, depending upon the relationship which exists between the time and the given parameter.

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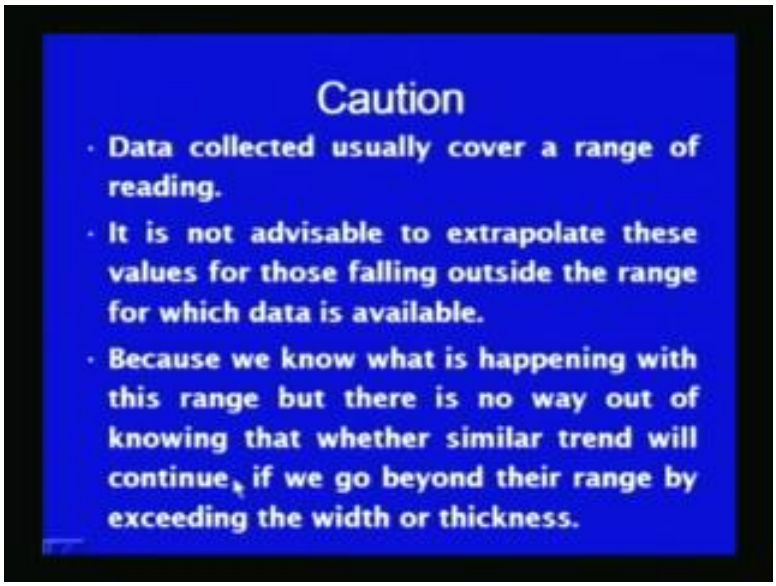

So, this is how the standard method can be used, to find out the time values for any activity which, for which the standard the time, data values are available in the organization. But, this technique is to be used with a care, because the data collected usually cover only a range of the readings and one should not go for the conditions,

which are beyond, the range for which data has been collected. It is not advisable to extrapolate these values for those falling outside, the range for which data is available.

Because, we do not know, what is going to happen with this range, which is outside, the range which has been investigated. There is no way out of knowing, that whether similar trend will be continue, will continue even beyond, the range which has been investigated or not. If we go beyond this range which has been investigated, then the reliability of the data will be very poor, so this technique has to be applied, only with the data values for which, only for the range of the parametric values for which data has already been established, by the time studies or PTS method.

Now, I here, I will conclude this presentation, in this presentation I have covered, mainly two methods of the work measurement technique, one is the PMTS which and another is the standard data method. Both these methods are very effective in establishing the time standard, without actually carrying out the visits of shop floor, where these studies to be conducted.

Thank you for your kind attention please.