Industrial Engineering
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Module - 3
Lecture - 9
Work Measurements and Time Study

Dear students in this presentation, I shall be talking about the Work Measurement it is importance and the techniques, which are used for work measurement and mainly I will be covering the Time Study technique of the work measurement. Work measurement is basically used to the standard of performance for a given job and also to find out a ineffective time if any which is present, so that the method study can be conducted and later on for improving the method.

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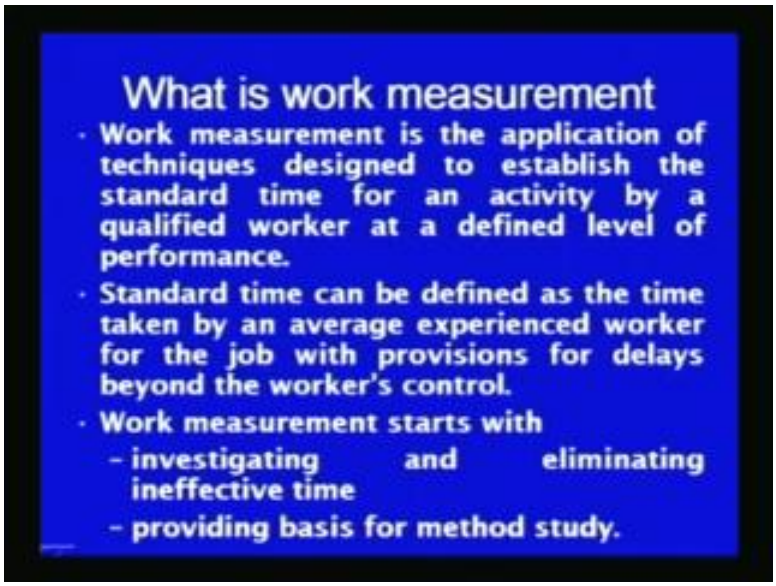

The work measurement is defined as application of techniques designed to establish the standard time for an activity by a qualified worker at a defined level of performance. So, the time is time standard is obtained as a result of work measurement, which is mainly the time required for carrying out a particular job by a qualified worker at a defined level of performance.

The standard time is defined as the time taken by an average experienced worker for the job, when required allowances for the force delays are taken into account. So, the standard time includes the time taken by the worker in carrying out the job plus

allowances required for the force delays or the delays caused by the factors beyond the control of worker.

Work measurements technique mainly starts with investigating and eliminating the ineffective time, if it is there in existing working method and also which in turn provides the basis for the method study. If the time study if the work measurement is to be used for setting the standard of performance, then generally method study is conducted first for setting the standard practice, which is not having the ineffective time. And later on the work measurement is carried out to set the standard time for a standard practice, which can be used for many important applications.

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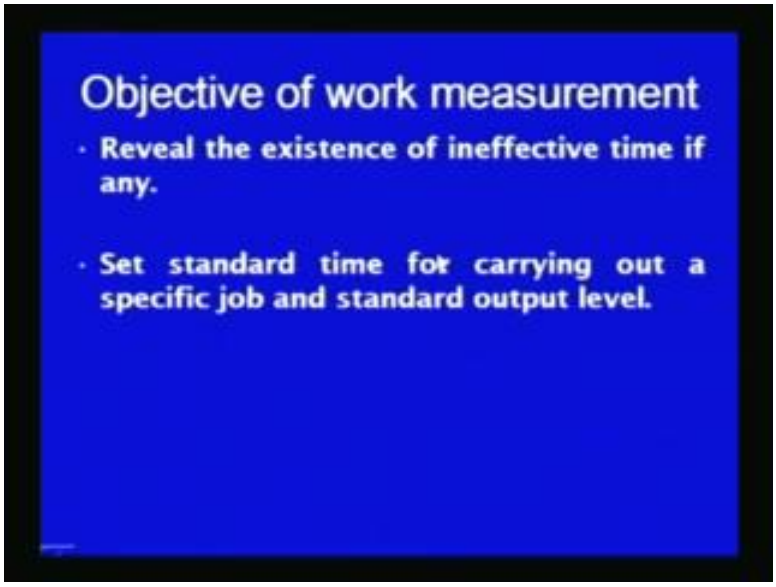

The objective of the work measurements are mainly to find out the presence of ineffective time and it is extent. Whether ineffective time is present in existing method or not and if it is there, then what is the extent of ineffective time, which is there, so that it can be eliminated by carrying out proper method study.

So, revealing the existence of ineffective time provides the venues for method study, so that a method of doing a particular job can be improved. Another important objective of work measurement is to set the standard time for carrying out a job by a specific procedure and also to set the standard output level; so that the proper production planning and the other important activities can be carried out.

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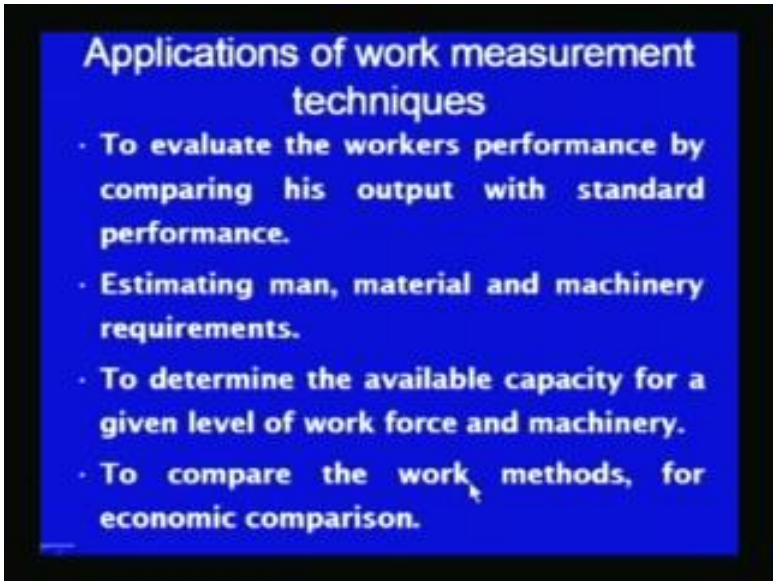

Applications of work measurement technique, which in turn results in the setting of the standard of performance in terms of the standard time. And investigating the ineffective time leads to have the number of benefits and these benefits appear in form of a evaluation of the workers performance by comparing his output with the standard performance.

The work measurement techniques can be used to compare the performance of one worker or a group of workers and their performance can be compared with the set standard of performance. If they are performing better then they can be then the incentives can be given for them, so for setting the incentives and preparing the wage plans also the standard of performance is used.

Estimating the man, material and the machinery requirement if an organization knows that this is the rate at which the things can be produced. This is the time required for producing an unit product then the same information can be used to quantify and to estimate the requirement in terms of the man, material and the machinery. So, that the production can be run smoothly and the future demands also can be met.

So, estimation of the resources for the different types of the requirements can be done effectively if the work measurement is carried out for setting the standard of performance. It also helps to determine the available capacity for given level of work force and the machinery, if an organization knows this is the work force and these are the systems available and the units can be produced at this rate, then this information can be

used to find out the rate at which the capacity of the organization for producing the given product. So, the available capacity for a given work force and the machinery can be calculated from the standard of performance.

To compare the work method for economic comparison purpose, if there are various possible alternative ways for carrying out one job, then their effectiveness in terms of the economics can be compared using the work measurement technique in terms of the work content and the time required for carrying out the job by the different methods.

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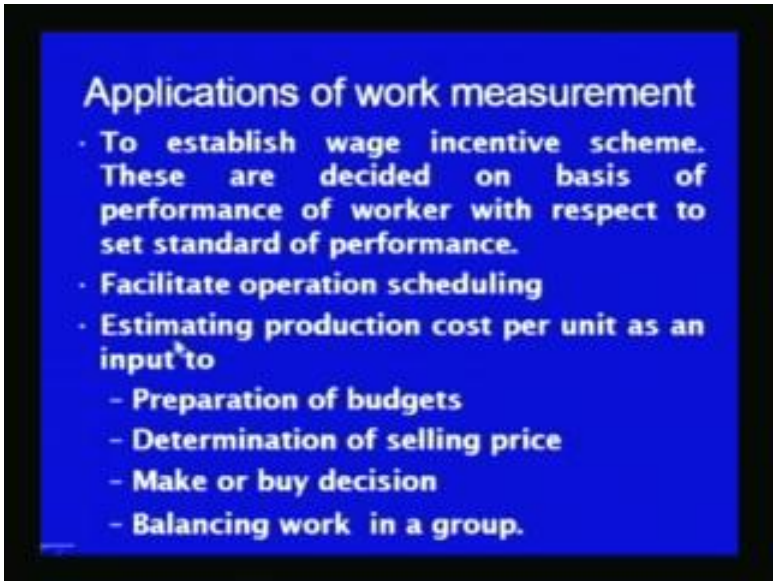

In addition to the above applications of the work measurement techniques some other applications include establishing the wage incentive plans and the work measurement techniques can also be used. Where the time standard set by the work measurement technique can be used for establishing the wage incentive schemes. These are because these are decided on the basis of performances of the worker with respect to the set standard of performance.

The another application of the work measurement technique is to facilitate the operation scheduling in which way things are to be done how much machine there man power is required for completing and given output that can be successfully done, if the standard of performance is known.

The estimation of the production cost per unit as an input can be used, if it is related with a unit time required for producing a particular product. And, the same information can be used for preparation of the budgets to determination of the selling price make or buy

decision and balancing the work in a group. So, the time which is required for completing a given job and which is established by the standard of performance can be used in number of ways in the manufacturing organizations.

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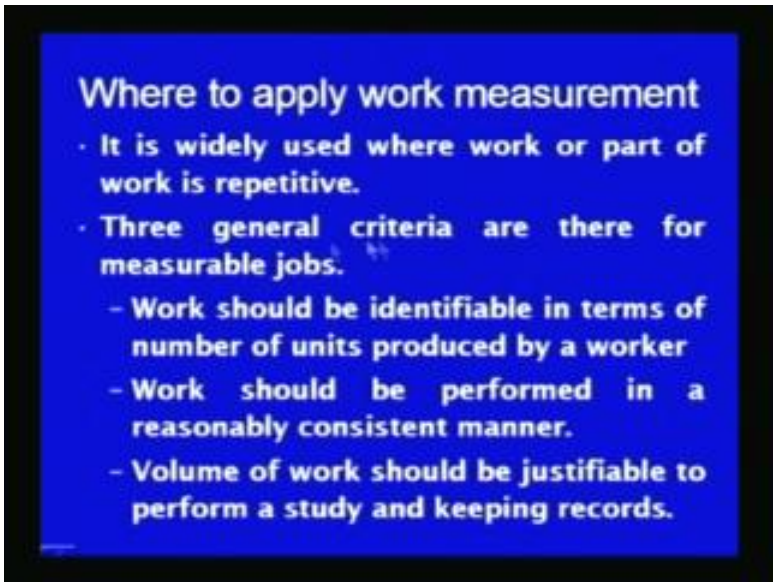

What are the typical situations, work measurement techniques can be effectively used for quantifying the work content and the setting the standard of performance is very important to know? These are mainly applied where either entire work or the part of work is repetitive in nature.

And, the work should have the specific characteristics apply the work measurement related techniques like the work should be identifiable in terms of the number of units produced by a worker. Work should be performed in reasonably consistent manner and the volume of the work should be justifiable to perform a study and keeping the records. The work where work measurement technique is to be applied should have very specific characteristics, which can be quantified in terms of the units, which can be produced by a worker. It should be done in consistent manner and whatever work measurement is carried out.

It will involve the time and resources, so the investment of the resources will be justified only if the volume of work which is a being done on account of the work measurement is justified. So, the volume of the work that is why should be justifiable to perform the study and keeping the record, then for performing the work measurement and quantifying the standard of performance and investigating the ineffective time.

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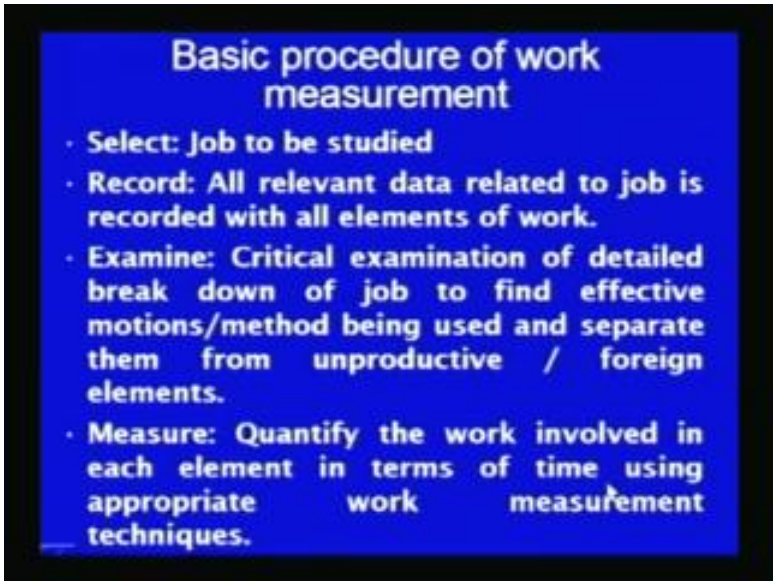

In general all measurement techniques follow seven basic steps for carrying out the work measurement These basic steps of work measurement includes the selection of the job to be studied, the job which is to be studied for work measurement should be economically important and that should help in increasing the productivity of the organization.

After selection of the job next step is to record all the relevant data related to the job and with all elements of the work. The methodology which is being used for carrying out a particular job is recorded along with all its elements. And then after recording the recorded method is critically analyzed to see the presence of only the required method required movements or the required steps whether there is any unproductive or the foreign element is present or not.

So, the critical examination of the recorded method is carried out to see the presence of the unproductive or the foreign elements and also to see all the elements of the work are required and necessary for carrying out the job. So, the critical examination of the detailed breakdown of the job is carried out to find the effective motions and the method is being used and the effective steps are separated from the unproductive and the foreign elements.

After critical examination and separating the required steps movements and the elements from the unproductive and the foreign elements. Next step is to quantify the work content with the each required element, so that is the fourth step measure in which quantification of the work involved if the each element in terms of the time is measured.

So, that work content for each element is measured in terms of the time using suitable work measurement technique. Depending upon the nature of work and the size of the element the different time measuring devices, and the work measurement techniques can be used after the quantifying the time required for carrying out different elements related with the job.

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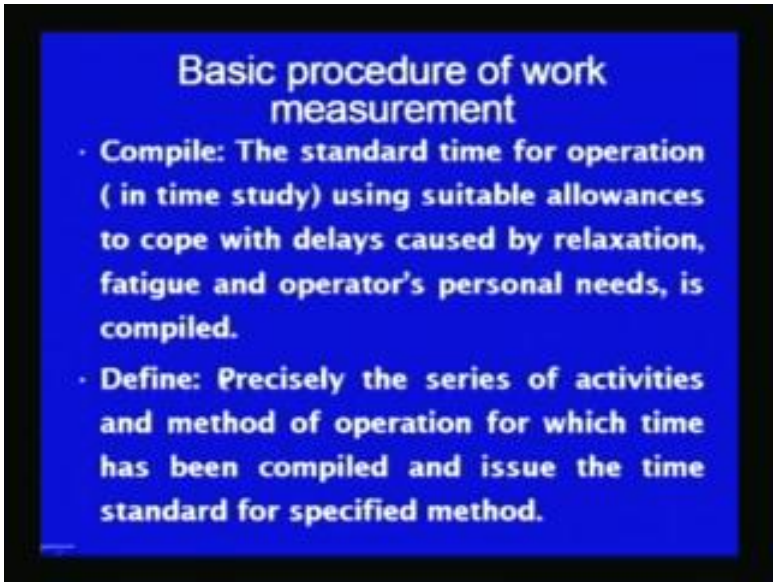

Next step is to compile, the time for each element which is time required for carrying out the each element. So, that the time standard for the operation can be set, and this compilation involves setting of the time for the operation using suitable allowances to cope with the delays caused by relaxation fatigue operators personal need, etcetera.

So here, the compilation of all the elemental times plus allowances is used to find out the standard time. And after, compiling the standard time for particular method it is defined very precisely that, what are the steps to be used for carrying out a particular job; So, that it will take this much time. So, that the definition regarding the time standard should be set very precisely giving series of activities and the method of operation for which time standard has been compiled and this the time is given for the standard specified method.

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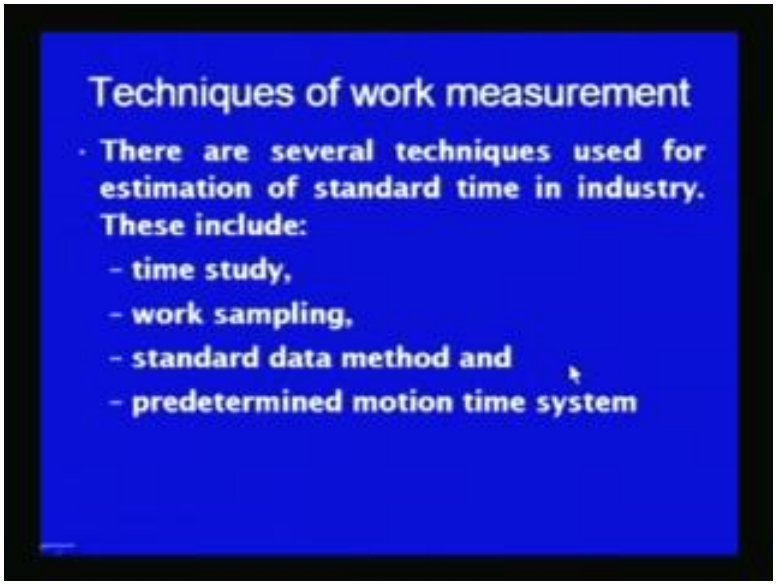

And, for carrying out the work measurement the depending upon the size of the elements and the total time for the cycle different types of the work measurement techniques are used. These techniques involve the time study these techniques the common techniques are the time study work sampling standard data method and predetermined motion time system.

The time study basically uses the use of a stop watches to quantify the time required to carry out the different elements of the work, while the work sampling in case of work sampling random observations of the work area is carried out to see and that what is happening at different movements over a certain period of time. And then judgment is made regarding the percentage of the workers who are working percentage of time the machines are idle due to one or other reason.

So, the random observations are basically used in work sampling to see, what is happening at any movement, the standard data method also the standard data method uses the time already set for the basic steps and those the time values are used to find out the total time required for carrying out the job.

And, the same thing is also used in predetermined motion time systems, where the time values are taken from the standard data hand books for the various basic human motions and the activities which are carried out by human being during the different kind of the activities. Like picking up of the certain thing switching on, switching off or moving

from one place to the another with different types of with different loads all these things have been standardized and have been and can be taken from the data hand books.

So, the predetermined time values are taken from the suitable PMTS systems and those are compiled to find out the total time required for carrying out the particular job and setting the standard of performance. So, actually the work study men goes to the top floor in case of the time study and in case of the work sampling, while in other two methods then the data which has been already developed by the time study earlier is used for setting the standard of performance.

So here, any of these techniques can be used for setting the standard time in industry, in case of time study suitable allowances are added to find out the standard time. And, the standard allowances are also added in case of work sampling, while in other cases is allowances are not added to find out the standard time.

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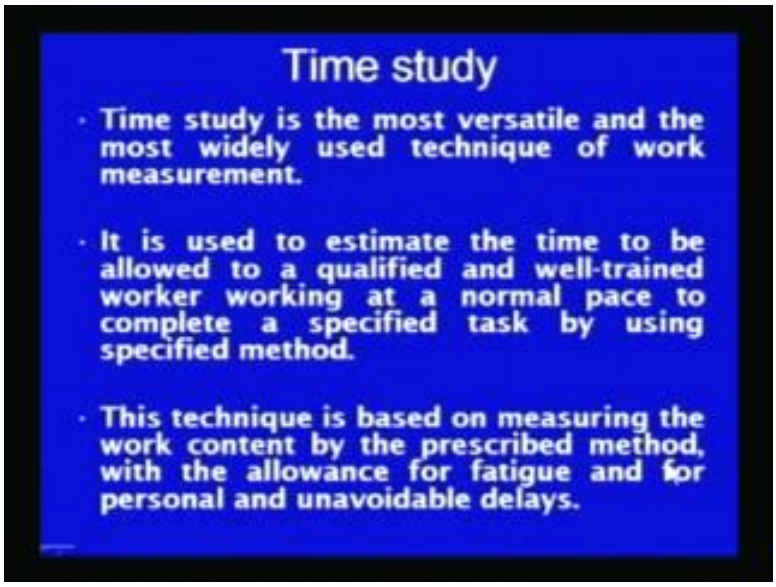

Time study is the first and foremost and very common technique which is used for quantifying the work content related with a particular job and its elements. This technique is most versatile and most widely used technique of the work measurements.

It is used to estimate the time to be allowed to a qualified worker qualified and well trained worker working at a normal pace to complete a specified job by using a specified method. So, basically time required to carry out particular job using standard method by a qualified worker is quantified by the time study.

And, that time is later on used to set the standard of performance, this technique is based on measuring the work content by the prescribed method with allowances for fatigue and other force delays and unavoidable delays. So, the time measured by the time study for carrying out a particular job by the prescribed method plus allowances are added to set the standard time.

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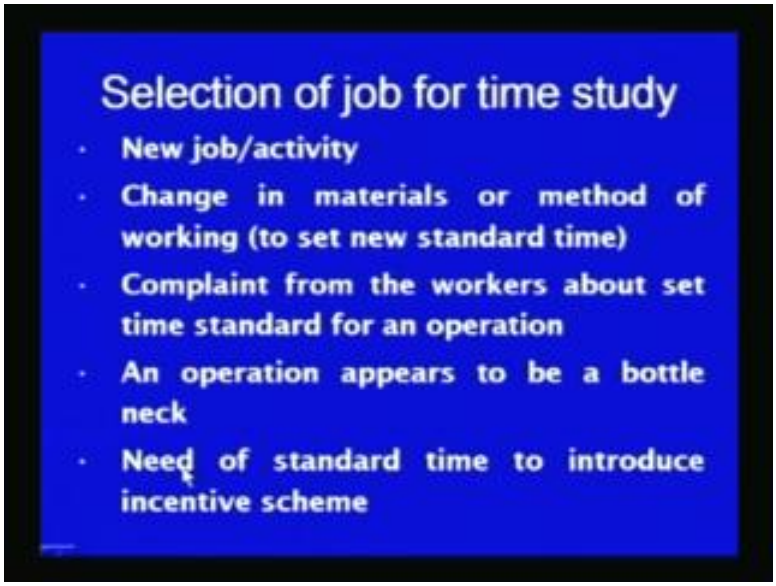

The basic steps which are used in the time study and the jobs which can be taken for the time study are very important, because the time study consumes lot of time and the resources in its performance. So, the job selection of the job for time study is important, because it is very time consuming and lots of efforts are required for setting the performance for a particular job.

So, if the job is new and if it is important, then only time study should be conducted if the job is not of that important which can affect the economy of the organization and the productivity of the organization then time study is on an early not conducted. But, if the job is of economic importance and its new then for setting the standard of performance for new job time study can be conducted.

If there has been a particular method of carrying out a job and it has been changed there is a change in material or the method of a doing particular job, then it will required new standard time. So, a new time is standard can be set for in cases when the there is change in material or the methods for doing a job.

The time study can also be conducted, if there is a complaint from the workers side regarding the time standards which has already been set earlier by the time study. If they may complaint that time standard which has been, set earlier is too tight and difficult to achieve which can affect their earnings and the wages.

So, the workers can complaint, if the complaint is there from the workers side, then time study can also be conducted to check whether their complaint is genuine or they are following wrong method for carrying out a particular job that is why, because of which they are not able to complete the job in time.

An operation which is appearing to be bottle neck in the production line can also be taken for the time study, this will be affecting the productivity of a the manufacturing system itself. So, may be of great economic importance, so the operation are the station which is looking, which is appearing as a bottle neck in the in the entire production line should also be taken can also be taken for the time study.

The need of the time standard time to introduce the incentive plans, what is the minimum expected level of performance by a worker by an average worker that if that is to be obtained for that the standard time is required. And, once the standard time is known then the workers who are able to finish the job earlier they takes less time than the set standard time is accordingly the suitable incentive plans can be made for the workers who are quite good and doing the job fast and taking less time in completing the job and that is why giving the more output.

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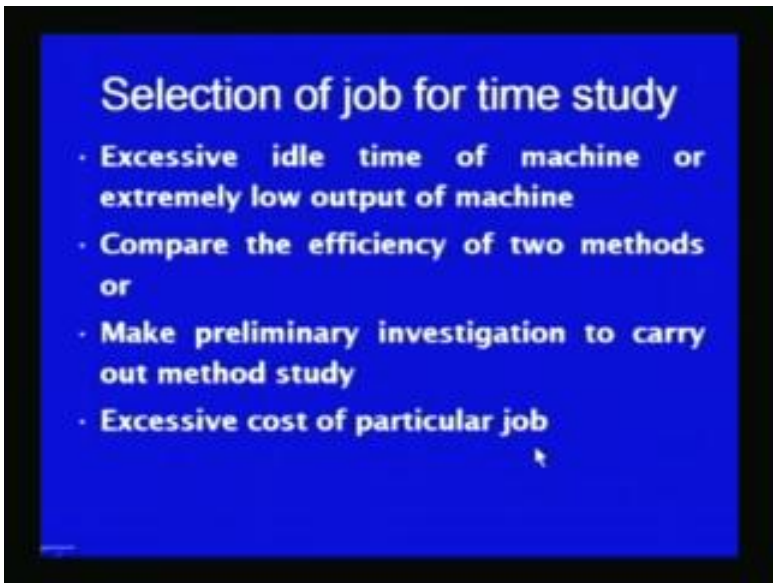

So, selection of the jobs for the time study can also includes the jobs which are taking excessive ideal time means the machines in which case the in the case is where the excessive time is involved ideal time is involved with certain machines or the machines which are giving very low output can be taken for the time study. Comparing the efficiency of the two methods and making the preliminary investigations to carry out the method study are also the certain conditions and the cases, which can be taken up for the time study. Excessive cost of a particular job is also good case where time study can be conducted.

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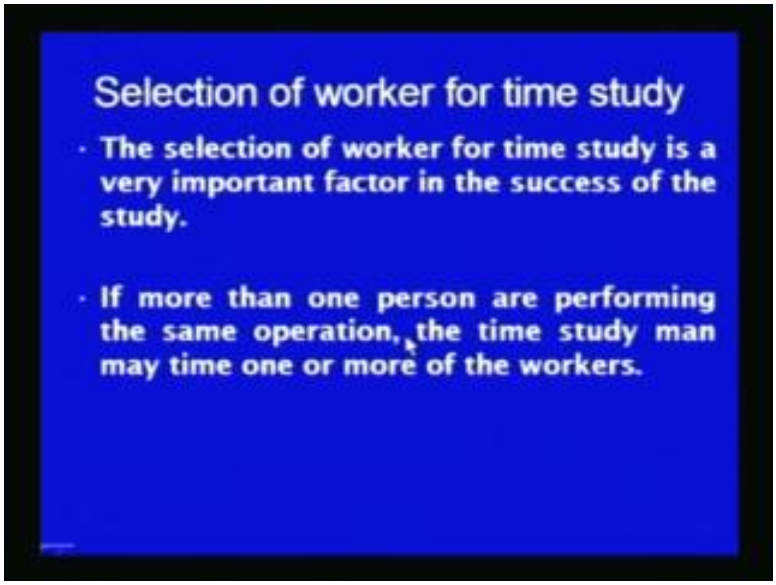

For carrying out the time study, it is necessary that a worker and the machine and the standard method is selected before carrying out the time study. Selection of the worker for time study is important, because if the worker is either very smart or very is not well equipped well trained with the method on which time study is to be conducted, then unnecessary he will take long time. So, the worker should be selected in such a way that he has got certain qualities, so that the work study can be conducted successfully.

Selection of worker for the time study is very important factor in success of the time study. If the more than one worker are working on the same operation then method study man and time study man can investigate and may time more than one workers at a time.

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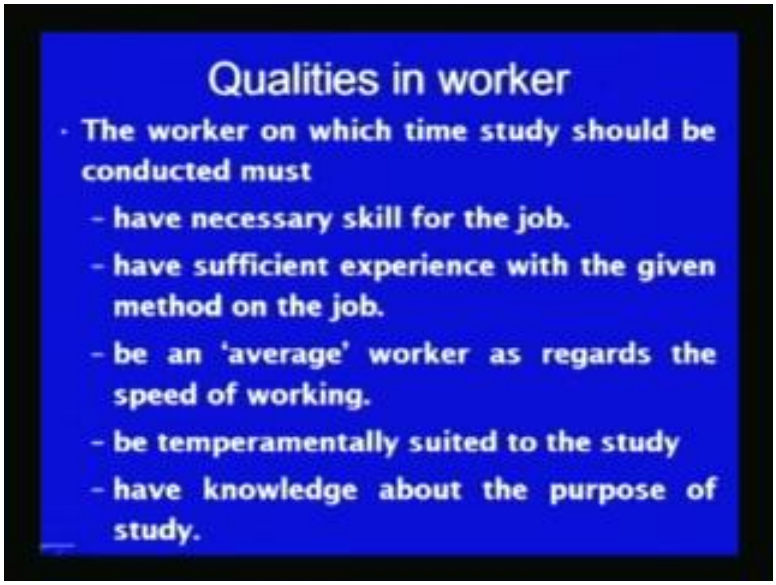

The qualities which should be there in a worker who should be selected for setting the standard of performance and carrying out the time study. The worker on which time study should be conducted must have necessary skills for carrying out the job he should be well equipped and trained with the worker with the job which is to be timed. And, he should have required experience, so that he is able to perform the same job consistently with almost same time. If generally, what happens that, with the increase of experience on carrying out a particular job the operator takes less time.

So, the time during which a worker learns and the time required to carry out the job decreases with the increase of working experience in that period time study should not be conducted. Time study should be conducted when worker has got enough experience and he has reached to a stage when the time required for carrying out the same job does not decrease with the further work on the same job.

So, he should have sufficient experience with the given method, so that a learning curve a learning phenomenon is not effecting to the time required for completing the same job and he should be an average worker as far as the speed of working is concerned neither too fast workers or too slow workers should be selected for the time study.

He should represent to the whole lot of the workers and that is why, normally average worker is selected for the time study and setting the standard of performance. He should be temperamentally suited to the study, he should be unnecessary very attentive and very cautious when either timing is carried out or when some sort of recording is carried out.

He should be able to perform successfully without getting effected in terms of the performance. So, for that purpose he should be temperamentally suited to the study and he should also have the knowledge about the purpose of the study, if he does not know the purpose of the study he will not be able to work sincerely on the job which is being investigated.

If the purpose of the work study and that the work measurement is mainly to investigate that presence of ineffective time and improve the method of carrying out a particular job. Then, they will work very happily and if the time study is to be carried out for setting the standard of performance and then they may take extra precautions and they may include extra steps. So, that the longer standard of performance can be set and a longer standard time can be set which in turn will help them in getting better wages.

So, he should have the knowledge about the purpose for which time study is being conducted it whether it is for just investigating the ineffective time and so as to carry out the method study effectively or the purpose the study is to set the standard of performance based on which the wage and incentive plans will be developed.

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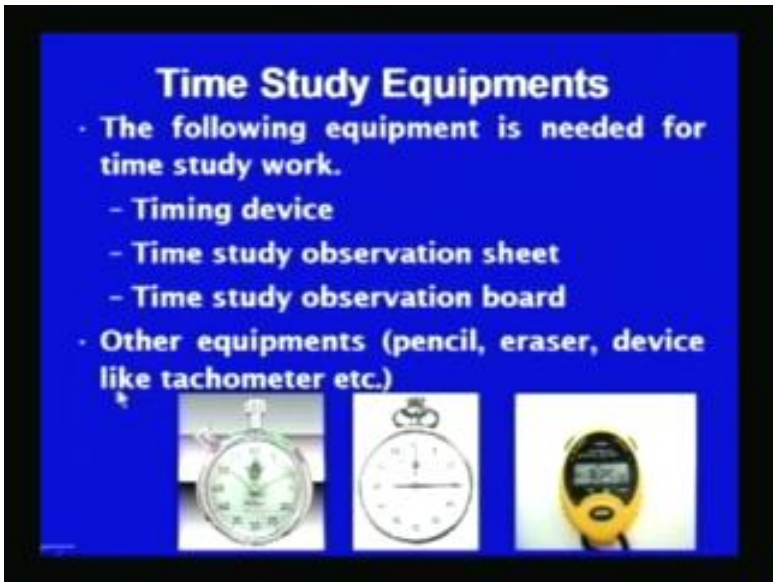

The time study is carried out using many equipments, but three equipments which are normally used in carrying out the time study which are very common and other things are a small one like pen and pencils. The following equipments are needed in time study like timing device, time study observation sheet and time study observation board. In addition to the above three pencil eraser and the devices like tachometer, the scale

etcetera is also used in time study. These are the three timing devices which have been shown and are commonly used, this is the fly back timing type of the stop watch non fly back timing type of the stop watch and this is the digital watch which can be used for recording the time very accurately and record the data related with the timing in its memory.

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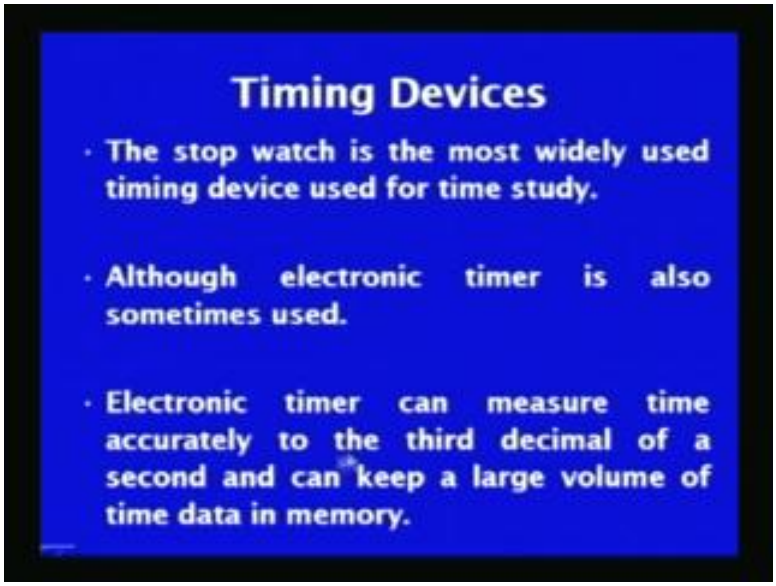

The timing devices will be covered one by one in bit detail. The stop watches are the most widely used timing devices for the time study, although electronic timers are also used, because of accuracy and their capability to store the data in its memory. Electronic timers can measure the time accurately to the third decimal of the second and can keep the large volume of the time data in its memory.

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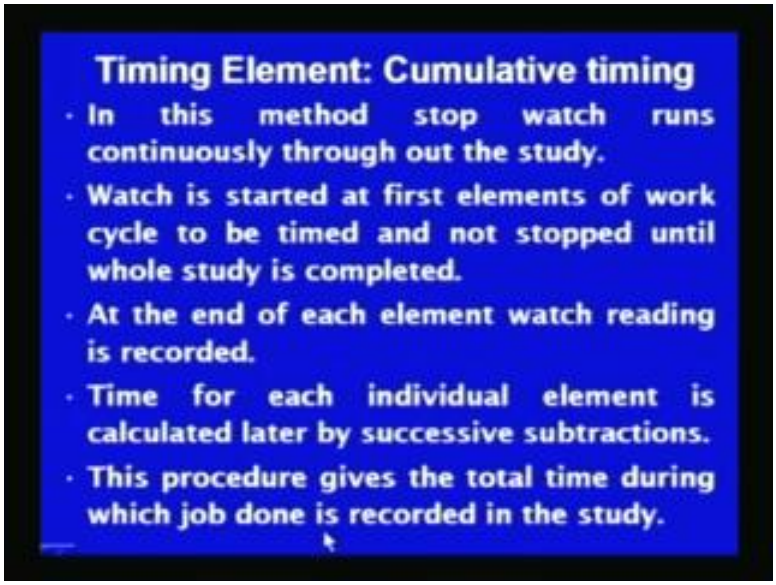

The two methods are mainly used in the time study, one is the cumulative timing and another is fly back timing. In the cumulative timing, the stop watch is started in the beginning of the first element and it is allowed to continue until the whole study is completed and all elements are covered. So, while in case of fly back timing, the timing of the each element is carried out separately, so that the time values for each element are obtained directly.

The difference in the cumulative and fly back timing is that there is possibility of loss of sometime well use in case of the fly back timing, while in case of the cumulative timing the total time is required for carrying out the job is recorded without loss of any time values.

In that cumulative timing method stop watch runs continuously throughout the study and watch is started at the first element of the work cycle to be timed and it is not stopped until whole study is completed. At the end of each element only watch reading is recorded, so that later on successive subtractions can be used to find out the time values for each element separately. And, this procedure gives the total time during which job is done and this is recorded in the study without loss of any time like in fly back timing method.

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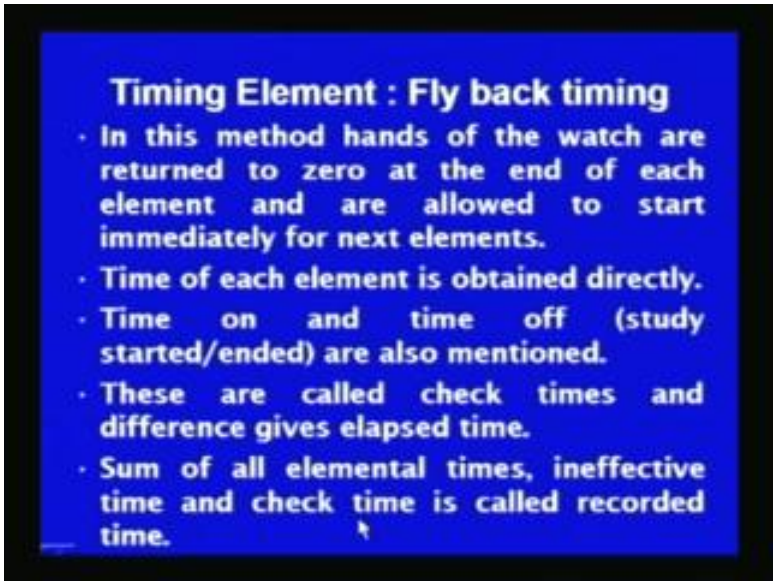

In fly back timing method, hands of the watch are returned to the zero at the end of each element and are allowed to start immediately for the next element. So, at the end of the each element hands of the watch are brought to the zero setting and again the watch is started to time, the another element and the next element immediately. There is always possibility of loss of some time value in stopping and starting the watch for the next element.

The time for each element in this method is obtained directly and the time on and a time off times are also noted down these are also known as the time start study started and study end times. These are called check times and the difference gives the elapsed time, so the time on and at the time off values are also called check times and the difference gives the elapse time. And, the sum of all elemental times ineffective time and the check time is called the recorded time.

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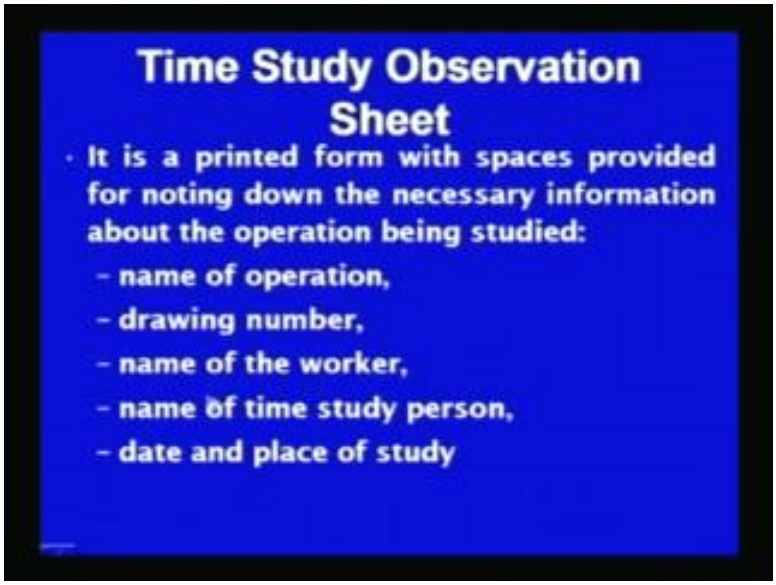

After the timing devices we have to use the observation sheet, where the time value for each element can be recorded clearly and separately. So, that later on representative values of the time for the each element can be obtained. Depending upon the timing method in different ways observation sheets can be designed, so that time for each element can be noted down accurately. The time study observation sheet is basically a printed form with the spaces provided for noting down the necessary information about the operation being studied. These include the name of the operation, drawing number, name of the worker, the name of the time study person, the date and the place where study is being carried out.

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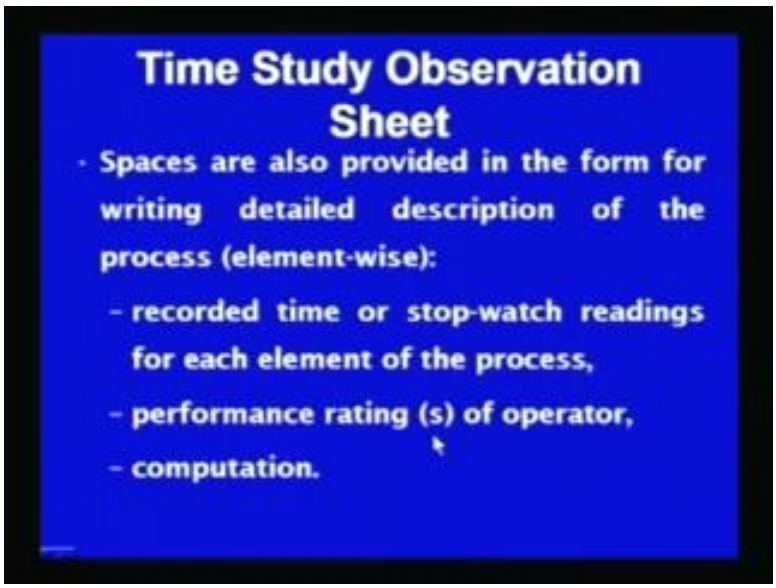

In addition to the above information spaces are also provided in the form for writing the detail description about the process itself. Recorded time or the stop watch readings, for each element of the process and the performance rating of the operator and the calculations related with.

So here, these are the three important components which are recorded in important things which are recorded in the observation sheet, and finally used to calculate the standard time. The recorded time for each element and the standard of performance adjusted by the work study man during the time study and the related calculations are also shown which will be used for setting the standard of performance and give a defining the standard time.

In addition to the timing device and the observation sheet it is also required to use the study board. Study board is mainly used for mounting the timing device and the study sheet, so that all the data related with the time related data can be noted down easily and the cleanliness and the neatness in the study sheet can be maintained.

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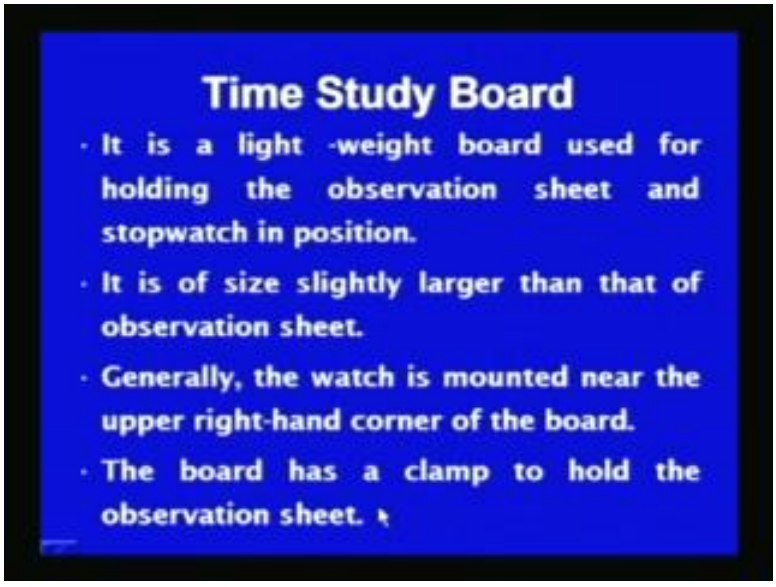

The study board is a light weight board used for holding the observation sheet and the stop watch in proper position. It is slightly its size is slightly larger than that of the observation sheet and generally watch is mounted near the upper right hand corner of the board. The board also has clamp for holding the observation sheet, so that the time can be noted down easily by the time study man and the cleanliness in the observation sheet can be maintained.

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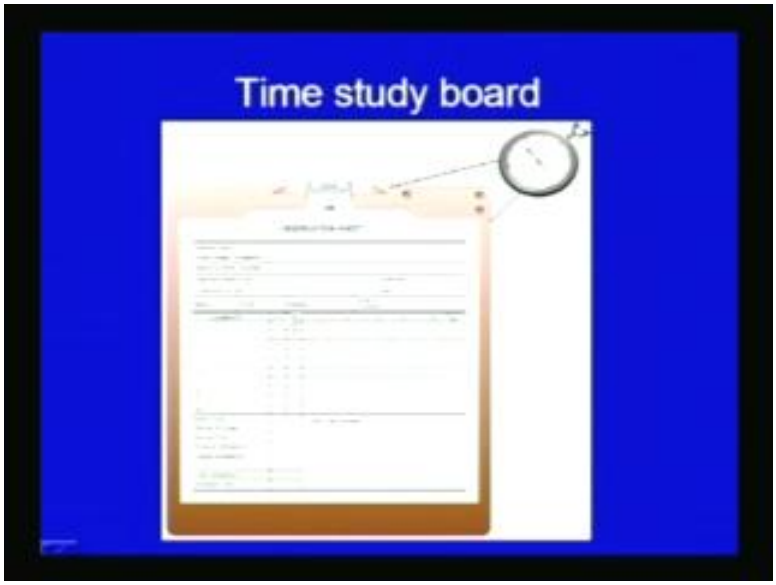

This diagram shows the typical study board in which in the top right hand corner stop watch has been shown. And, this is the clip for holding the time study sheet or the observation sheet where the time for the different elements can be noted down.

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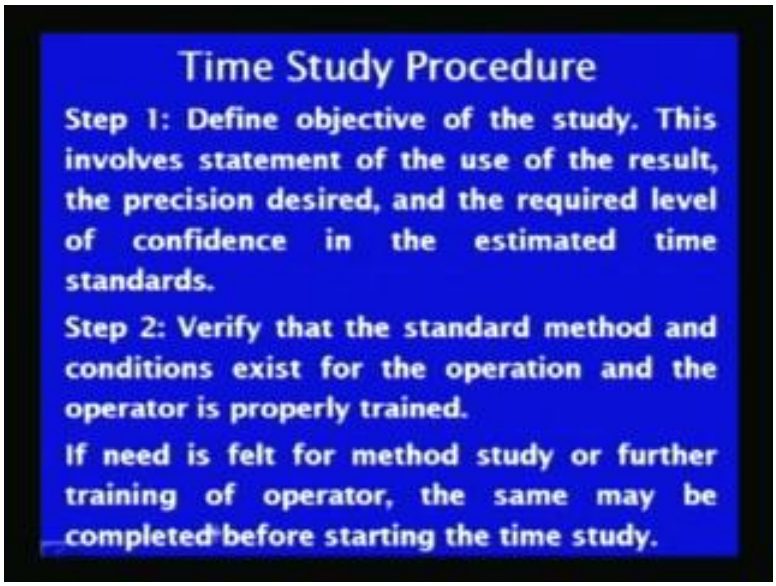

The time study procedure involves right from the selection of the job to the selection of the worker and timing of the different elements finding the allowances and the related calculations to set the standard of performance. It is starts with defining at the objective of the time study is to be precisely defined regarding its use. Use of the time study results for what purpose, what will be the use of the time study results, should be clearly

described at the same time precision desired in the time values and the required level of the confidence in estimated time standard should also be described clearly.

So, the first step in time study is to define the objective of the study and the precision desired and the confidence level desired in the estimated time standards. In the second step is to verify that a standard method is being used for carrying out to particular job and the operator is also properly trained.

If the method is not perfect then method study should be conducted first and standard practice is followed. And, if the worker is not also properly trained, then he should be given enough time for carrying out for proper learning and getting the training on the method which is to be timed. If the need is felt then method study or the further training of the operator can be done and the same, then the time study can be completed after setting the proper standard method and proper training of the operator.

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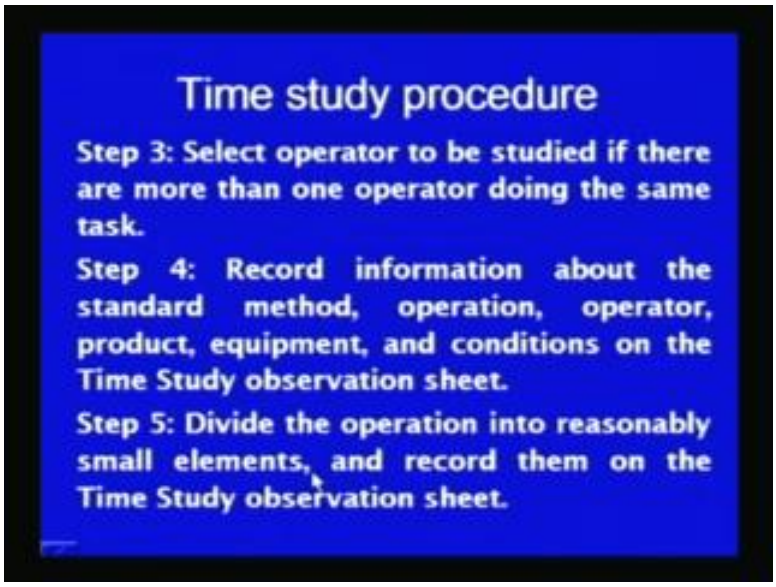

The third step in the time study procedure is to select the operator for the study purpose. If the operator is not selected properly either he is not very familiar with the job or he is temperamentally not suited for the time study and he should not be selected. So, operator should be selected having the desired qualities and if they are more than one operator than the number of operators can be selected for the study by the time study man. And, then recording the information about the standard method operation being used operator who is performing the work, the product on which study is being conducted equipments

and the conditions in which study is being conducted are recorded in the observation sheet.

Any factor which can effect the time required for each element is to be recorded on the observation sheet which can range from the standard method operator operation product equipment or the conditions in which work is being done. And, after recording the general information and the conditions in which the work is being done. And the operation is divided into the reasonably small elements, so the time values for each element can be noted down and measured accurately using the suitable time devices. So, divide the operation into the reasonably a small elements and record them on time study observation sheet.

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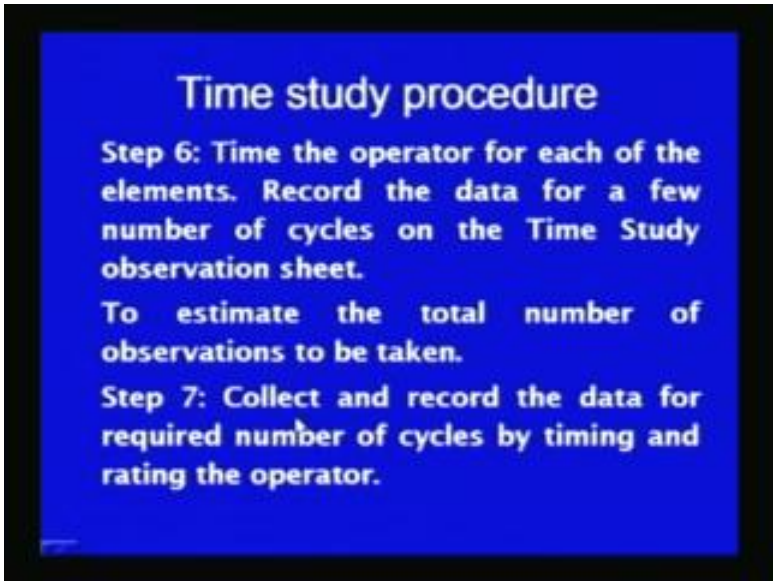

After dividing the operation into the small elements and noting down them in on the study sheet, the time values for each element which operator will be taking during the operation are noted down. Record the data for few numbers of cycles for each element on the study time observation sheet.

To estimate the total number of observations, how many observations should be taken for each element, so that some degree of confidence can be achieved a proper procedure is used to find out a number of observations should be taken for each element. And, again the confidence and the desired accuracy in the data which is being obtained after the time study.

Next step is to collect and record the data for required number of cycles by timing and rating the operators. Not only the time values will be noted down for each cycle for each element for the required number of the cycles, but the operator performance is also judged by the time study man with respect to his own concept of the standard performance.

So here, the editing of the operator during the work is done by the time study man and his performance is compared with his own concept of the performance. So, if his performance is 100 percent means that he is working at a speed at which he should work according to the standard of performance concept of the time study man. If he is working slow, then he will be rated low or if he is working fast, then he will be rated high accordingly. So, in addition to noting down the time values a worker is no worker's performance is rated for each element.

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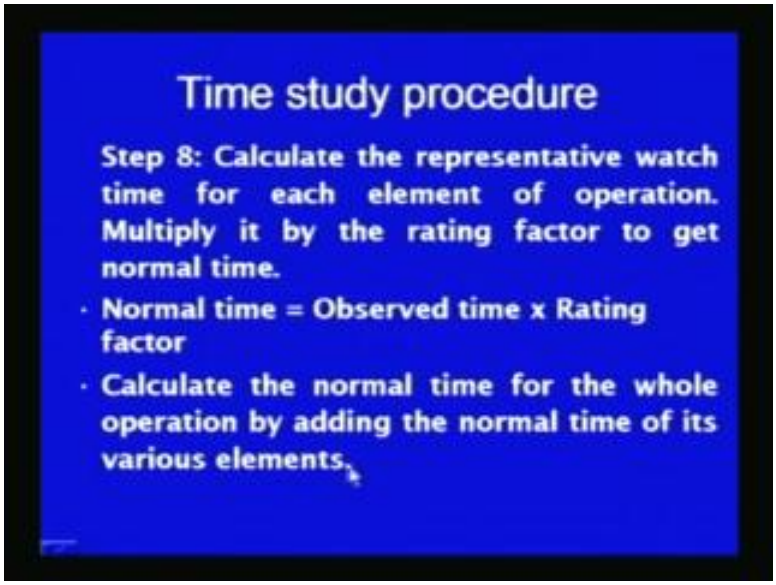

Next step in the time study procedure is to calculate the representative stop watch reading for each element of the operation and multiplying it by the rating factor. So, as to get the normal time, after noting down the observed time values and rated values of the operator the product of the two is use to find out the normal time.

So, normal time is obtained from the observed time into the rating factor and then normal time for all the elements is added to find out the total normal time for the operation. So, the normal time for whole operation is obtained by adding the normal time for its various elements.

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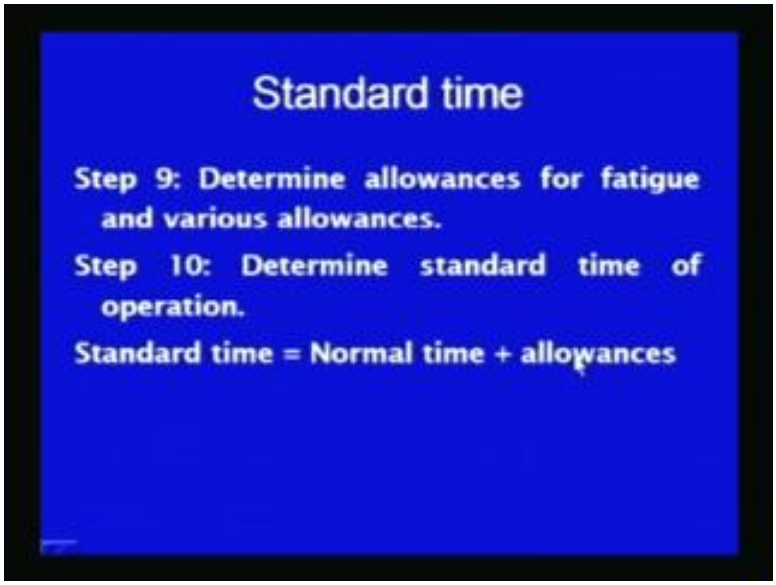

Next step is to find out the percentage of the allowances to be given, so as to cope with the forced delays like operator's personal need lack of material production delays are the basic fatigue or any other special allowance which is to be given. So, that percentage of the allowance is to be identified depending upon the kind of work which is to be done by the worker and the organizations policy. And for determining the standard time the normal time is added with the allowances, which has been decided as per the work to be done or the or the policy of the organization.

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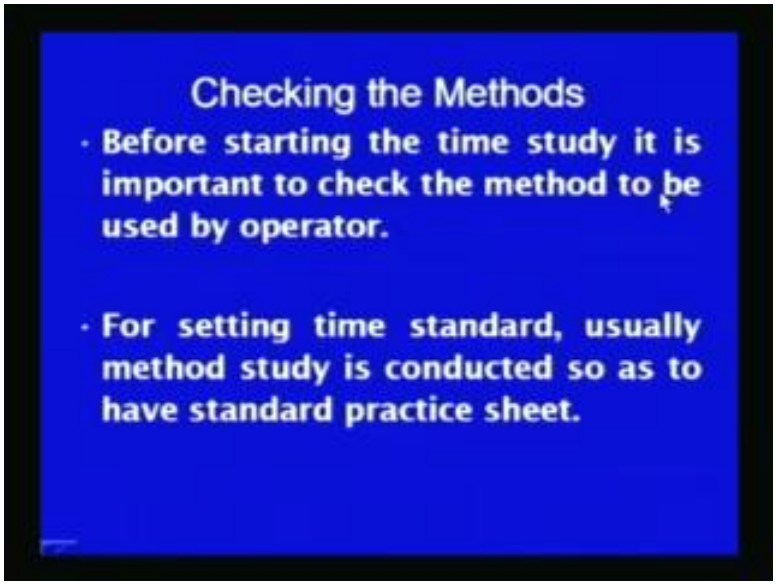

So, the standard time is set after getting the normal time for a job and adding the allowances to the normal time. For setting the standard of performance and carrying out the time study for its various elements, it is necessary that the method is checked thoroughly for its perfectness and to see that whatever method is being used is standard is corresponding to the standard practice or not. So, before starting the time study it is important to check that method to be used by the operator is perfect or not. For setting the standard time usually method study is conducted first, so that standard practice sheet is made available for carrying out the time study.

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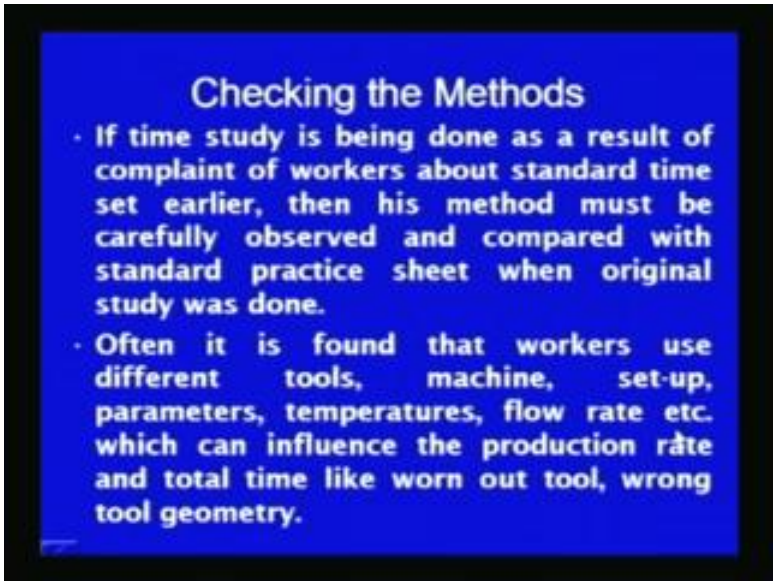

If the time study is being done as a result of complaint of the workers about the standard time as set earlier, then the method must be carefully observed and compared with the standard practice sheet when originally study was carried out. If the time study is to be conducted as a result of complaint from the workers that two standard has been set and it is difficult to achieve under the normal working conditions or it is causing excessive exertion to achieve the desired time standard. Then, it will be required to investigate the set standard time again and for investigating that it is necessary to see and observe that, what practice is being followed, and whether it is same as recommended in standard practice sheet or not. Most of the time, it is found that the workers intentionally or unintentionally include some of the foreign elements in the work cycle. And, they start to follow the different steps which are not there in standard practice sheet, because of which they take longer time to complete the same job.

And, that is why, it is often found when the method which is being followed is investigated that workers use different tool machines setup parameters, temperature flow rate or any other working conditions which can influence the production rate and the total time required for carrying out the job. These other conditions may also be in form of like worn out tool wrong tool geometry can take longer time for carrying out a machining operation. So, the checking of the proper practice checking of the method which is being followed and it is compared with the standard practice to see if any unnecessary. And, the extra elements are there are not and if they are present then steps can be taken to correct the method.

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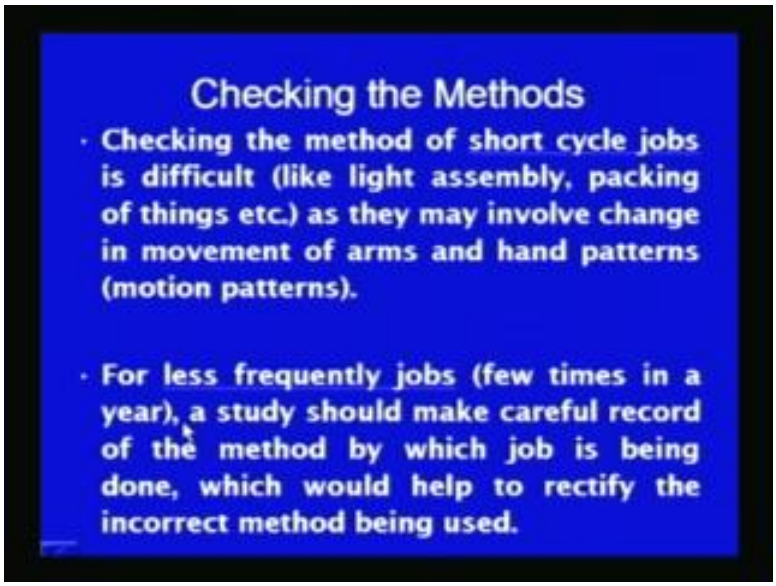

Checking of the method of very short cycle jobs is found very difficult, because minor difference in the path of movement of the body parts and can lead to the change in the time required for performing the given job. Like light assembling, packing of the things time required for light assembly and packing of the things may vary significantly if there is change in movement of the arms and the hand patterns.

So, it is difficult to check these movements by naked eye and to see that, what difference is there in the method, which is being followed and how much difference is there with the method, which has been described in standard practice sheet. And, the another problem in checking of the existing method is related with those jobs which are carried out rarely or they are carried out few times in year.

So, the study should be conducted carefully to record the method by which job is being done which will help to rectify the incorrect method being used. So, especially the problem is of checking the method is found in case, where job is done very rarely or the jobs which are of very short cycle, so short cycle and they take very in less time.

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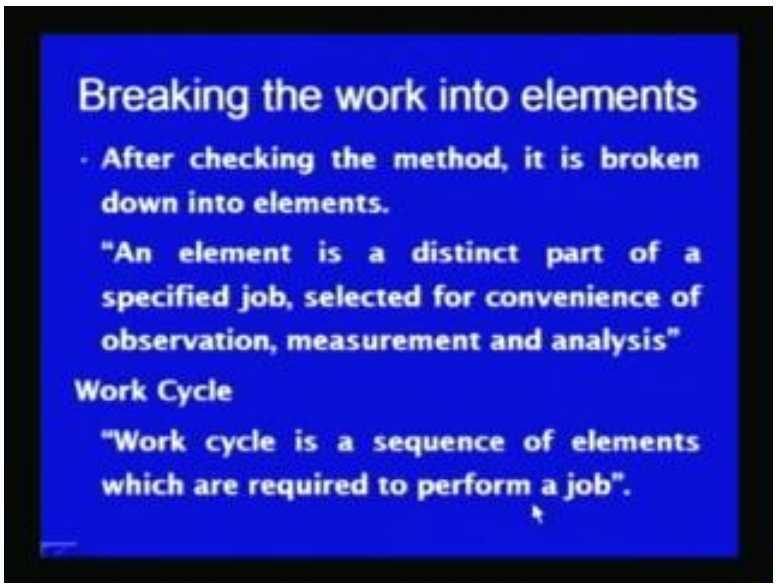

For effective time study it is necessary that entire job to be investigated for the presence of ineffective time and setting of the standard of performance is that it the job operation is broken down into the fine elements. This helps to check the method properly and to compare it to the set standard practice.

So, after checking the method the job is broken down into the elements and an element is defined as a distinct part of the specified job selected for the convenience of observation measurement and analysis. And, an operation can be broken into the number of elements and these elements are identified in such a way that the time for those elements can be measured accurately, and they can be analyzed easily using the available timing devices.

Well the work cycle is this is the sequence of the elements which are required to perform the job. So, when an operation is broken down into the number of elements, so that each element can be analyzed separately and all the elements are carried out in one particular sequence, then that forms the work cycle and which is required to perform a given job, breaking of the job into the small elements help to analyze the job very carefully and to see the presence of any unproductive element or ineffective time.

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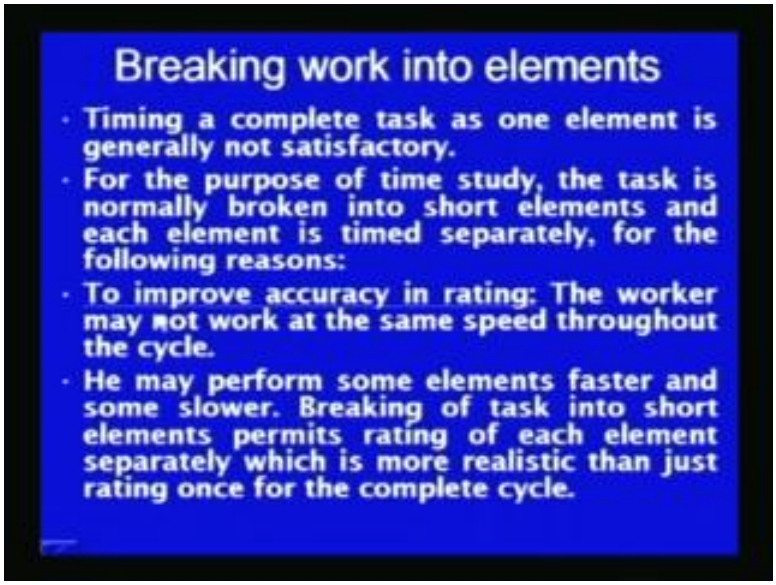

The timing a complete task as one element is generally not satisfactory, because workers are not able to work at the same pace on all the elements. So, timing of all the elements in one go is not found very good for rating the various components of the work. For the purpose of time study task is normally broken down into the short elements and each element is timed separately. The reason for breaking the job into the short elements are many and some of these have been highlighted like to for improved accuracy of the rating of the worker it is necessary that his pace of work is rated separately for each element.

Because, the workers may not be able to work at the same speed throughout the work cycle, so if each element is rated separately it will help to improve the accuracy of rating of the worker. He may perform some elements faster and some slower, so breaking of the task into the short elements permits the rating of the each element separately which is more realistic than just rating once for one complete cycle. So, breaking of the job into the elements and the rating the worker for each element gives more clear picture about the performance of operator while doing the job.

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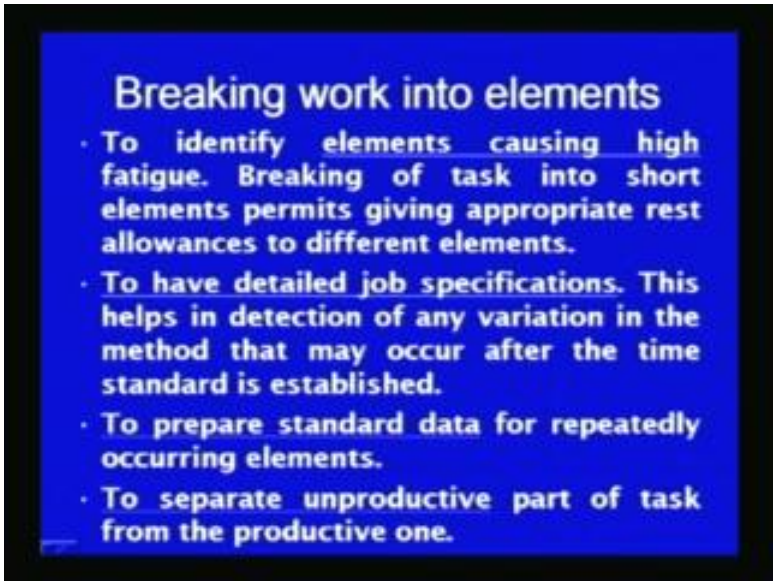

And, not only this when the job is carried out using the different elements and each element is analyzed separately, it helps to reveal that what are the elements causing more fatigue compared to the others. So, that those elements causing excessive fatigue can be isolated and the suitable fatigue allowance can also be given for those elements.

But, this identification of a about high fatigue causing elements is possible only if they are broken into the short elements. So, to identify the elements causing high fatigue the breaking of the job into the short elements also help, breaking of the task into the short elements permits the appropriate to allow the appropriate rest allowances to the different elements.

And, also help in isolating the elements which are causing excessive fatigue, to have the detailed description is the another important benefit which is achieved by breaking the job into the element. This helps in detection of any variation in method that may occur later on by the workers or that workers may follow later on which may be different from the standard practice, so that if the workers start to follow the different methods that can be detected easily.

If the standard if the job has been broken into the short elements and the step by step the method, which is being followed by the workers actually, and the method which they should follow can be detected easily means that the difference can be easily detected to see that, why they are taking longer time. If the workers intentionally follow some other

foreign elements; obviously they will be taking longer time and then complaining about the type time standard.

So, that complaint can be easily attended by looking into, what method is being actually followed and what method has been recommended, so the difference can be easily identified if the detailed job is specifications or available. And, another advantage of breaking the job into the element is to prepare the standard data for repeatedly occurring elements. Like, because the job is broken down the small elements some of the elements are of constant in nature, some of the elements are very a regular type which will be repeated in most of the operations.

If the time values for those operations those elements have been identified by the time study it will help to develop the data bank about the elements which are repeated in the different work cycles and in the different operations. So, these time values can be used in the standard data method or in PMTS method.

So, as breaking of the job into the small elements and obtaining the time values for each element also help in developing the standard data bank for repeatedly occurring elements. One more important objective which can be achieved by the breaking the job into the elements is that it can help us to separate the unproductive elements from the productive elements and identification of the unproductive elements can help in developing the better method, so that the entire job can be completed in less time.

Now, I shall summarize this presentation, in this presentation I have mainly talked about the importance of the work measurement its techniques like the time study and the time study procedure and the steps, which are required to be taken for carrying out the time study and set the standard of performance.

Thank you for your attention please.