Work System Design
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Lecture – 40
Performance Rating

Namaskar friends, welcome to the last session of our discussion in week 8, we are currently in the 40th session of our course on work system design and now as you are aware we are currently discussing the work measurement. In the previous 4 weeks, our discussion primarily was focused on developing a better method, best method of doing a job.

In this, if you remember we are trying to cover the various tools and techniques that can be used for calculating the standard time for performing the task or the operation or the job which has been developed or specified during the method study. So, in method study, we find out the one best method for doing the task for performing the job or the sequence of operations and in work measurement.

We try to establish a standard time required for performing those jobs, following the standard method that is installed that is maintained after the method study, so these are 2 important techniques; the method study and the work measurement. So, in method study we develop a better method, in work measurement we try to set a standard time for doing the task. If you remember just to have a revision of what we are covering during the work measurement that is during this week.

We have understood the basic concept of work measurement that why work measurement is required, what are the objectives, what we will gain if we set the standard time for performing each and every task? What are the advantages, what are the application areas of work measurement, then we have seen what are the various techniques that are used for work measurement or for finding out the standard time for performing a job.

And if you remember we have seen stopwatch, time studies synthetic data, predetermined motion time systems, historical, analytical review, so we have seen that there are a number of

techniques, which can be used for finding out the standard time. And these are applicable for different situations, so depending upon the situation we will select that which technique can be employed. Then, we have also covered may be the steps or the procedures that are followed for conducting the work measurement or for calculating the time required.

So, we have seen that there are step by step procedures or there are steps which we have to follow in a proper sequence to find out the standard time. Followed by that we have seen that what are the various standard equipment that are use, we have seen types of stopwatches, we have seen some watches will be the cumulative time, some watches will give you a fly back time, so there are different types of watches and time study board we have seen time study forms we have seen, a standard form was shown in the previous session.

So, basically we are trying to understand that how we can calculate a standard time, what are the techniques available with us which can help us to find out a standard time for performing a job and if you remember in the previous session, we have seen that there is a rating factor which we need to multiply with the observed time in order to calculate the normal time. So, how to rate the working of a worker or an operator, what can be the techniques employed?

Because as a time study analyst, I may have a standard rate or pace, which I have been trained to do that this is the actual or the standard rate at which a worker must perform this particular job, depending upon the complexity of the job, depending upon the use of the body movements for performing the job, depending upon the weights that the person has to move or he has to lift depending upon the environmental conditions that are prevailing, whether it is peak summer or it is peak winter.

So, depending upon so many factors, a rate has been defined that because of all these prevailing factors, this is the standard pace, standard rate at which a worker must perform his task and the time study analyst is trained with that standard pace. Now, I am the time study analyst if I go and start observing a worker, he may be performing faster as compared to my training or as I have been trained as the time study analyst.

I will say okay but he is slightly faster than the standard pace on the contrary, there can be other worker who is relatively slower than the standard pace of doing the work, therefore we need to rate, we need to provide a rating factor based on the standard; based on the observed time, so if we have seen that when we have seen the various steps involved in setting the standard time, first of all we do the observation, we use a stopwatch.

We calculate the time for the various elements which sum up to complete the job, so we divided if you remember we are taken an example of a stitching of a shirt in which the various elements of the work were shown or various work elements were depicted on the diagram, so we will try to find out, we will directly observe the time required for each element and then this observed time has to be multiplied by the rating factor in order to calculate the normal time.

And then, allowances are added to the normal time to find out the standard time, so first and foremost we need to observe and then the most important part is how we rate the performance of a worker and that is the target that we want to study today that what are the various techniques which are employed for rating the performance of a worker. So, after today's session I think you will get an idea that once you record the time using the stopwatch, so how to convert it into the normal time using the rating factor.

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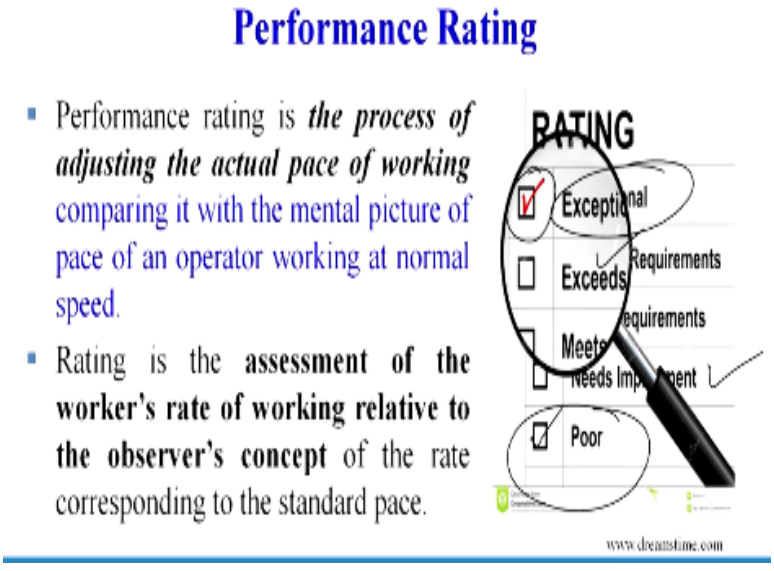

So, how to get this rating factor is the topic of our discussion today, first of all we will try to see that how do we define performance rating? Now, here in the example, you can see the rating is exceptional, it is ticked here, it can be it exceeds, it can it needs improvement, rating can be in some case, checked poor also, so that is one example that when we rate the performance. Now, what is performance rating basically?

Performance rating is the process of adjusting the actual pace of working, now this is important adjusting the actual pace of working, comparing it with the mental picture of pace of an operator working at a normal speed. Now, what is this normal speed? Normal speed is something to which that I am a study analyst has been trained, now depending upon so many environmental conditions, depending upon the way the work is being done, depending upon the effort required to do the work, a standard normal speed or a standard pace of work is defined.

Now, in case of performance rating, we are trying to compare, what is being compared? Comparison is between usually 2 things, so one is the actual rate at which the person is working or the actual pace of working, this is one and the other one is normal speed, what is the normal or the standard speed for working, so these 2 are compares. So, performance rating is the process of adjusting the actual pace of working comparing it with the mental picture of the pace of an operator working at normal speed.

Now, rating is the assessment of the workers rate of working, assessment of the workers rates of working relative to the observer's concept of the rate corresponding to the standard pace, so there are 2 things that are coming into picture; workers, rate of working, this is A and standard pace is B, so we have to compare the 2 that is what is the workers rate of working in comparison to or corresponding to the standard pace of working.

Now, what is the standard pace that I have already told that the time study analyst has been trained as per the standard pace of working? Nowadays, the standard rating some of you may be wondering that actual rate is okay, I am delivering this lecture, there is the rate at which I am uttering the words may be that may be faster, slower, so for some who are more fluent in English may be speaking much better than what I am trying to speak.

But there can be people who are even not able to speak as I am able to deliver the words, so there is a; this is my performance I am trying to speak good English, so I am speaking words; uttering words at a particular rate but that rate may not be a standard rate, so this is actual rate at which I am speaking but then there can be a standard rate at which a person who has learned English or who is expert in English must speak.

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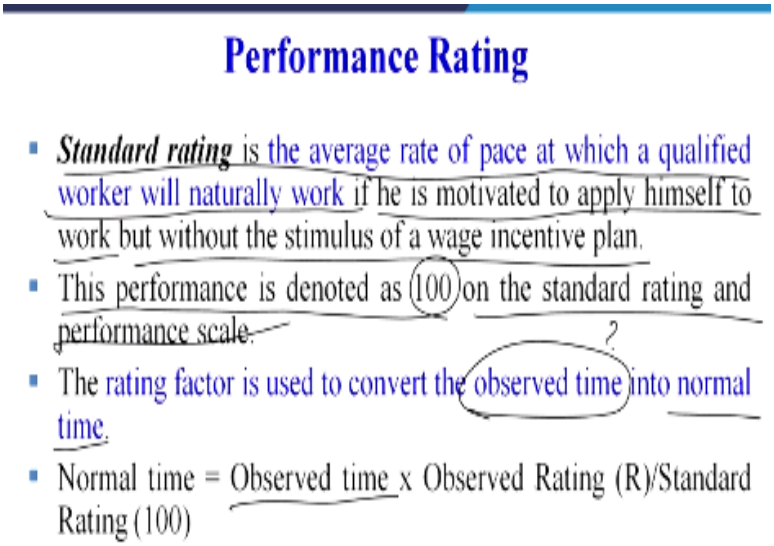

So that comparison between the 2 will give us the rating of my performance of speaking in English, so here we can see what is the standard rating, now the standard rating is the average rate of pace at which a qualified worker will naturally work for, so this is a standard pace, so naturally work means that without any constraint is naturally performing his or her task. If he is motivated to apply himself to work, he is not being forced to work.

He is not working that oh, I am not interested but still I have to work, so he is working naturally is self-motivated but without the stimulus of wage incentive plan that is also important, sometimes the person may deliver more because he knows that if I delivered this much quantity, I will get bonus or I will get promotion, so that type of motivation is also not there, so he is qualified, he is working at self-motivated levels.

Or he is motivated enough to apply himself for job, he is qualified, he knows how to do the job, he is motivated enough to perform his task, he is not motivated by the incentives or the bonus or the promotion, so that the rate at which or the pace at which he will work that will define the standard pace of working or the standard rate of working, this performance is denoted as, now, this is what we call as 100 on the standard rating and performance scales.

So, that scale we say as 100, when a qualified worker, experienced worker, motivated worker the rate at which or the pace at which the person will deliver his work that basically is the standard pace and that we usually denote my 100. The rating factor is used to convert the observed time into the normal time, this in the very beginning today, I have told observed time is what; we directly record using the stop watch.

Then, we converted it into the normal time, how? Normal time is = observed time which is coming from the direct observation of the worker multiplied by the observed rating divide by the standard rating. Now, standard rating is what? It is 100, what is standard rating; it is coming from here, the standard pace at which a worker must work, he is a qualified worker, so at the rate at which he must work without any motivation of wages, incentive or increase in the bonus that is the standard pace at which you must work.

Now, there are different method systems of performance rating, now we have already seen how to convert the normal time into the; sorry, how to convert the observed time into the normal time by multiplying it by the observed rating divided by the standard rating, so this is a performance rating, this one is the performance rating.

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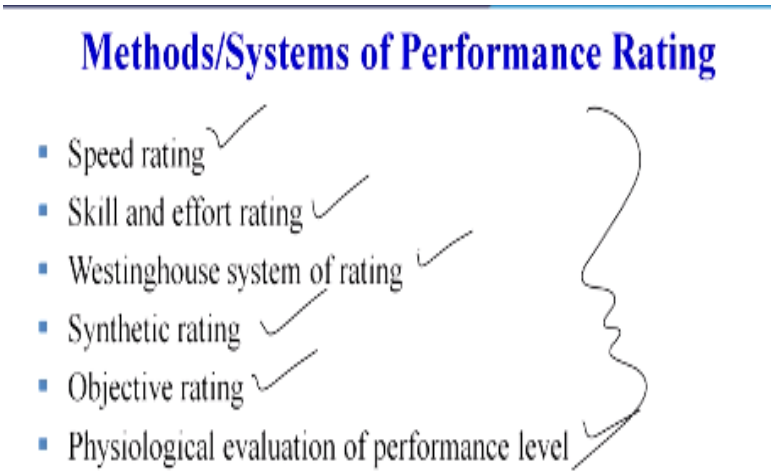

So, here we will see the different systems, methods of performance rating, one is simple speed reading, skill and effort rating, Westinghouse system of rating, synthetic rating, objective rating, physiological evaluation of performance level, so there are different techniques of rating the pace of worker who is performing his or her task. Now, let us see one by one may be whatever we can cover in our span of half an hour.

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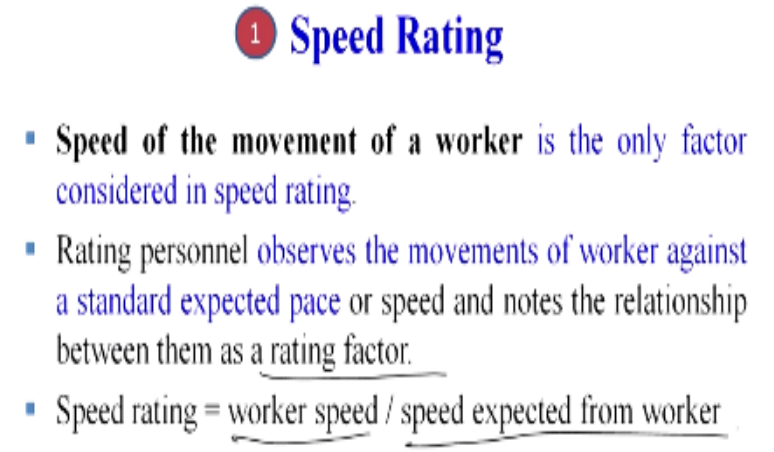

So, speed of movement of a worker is the only factor considered in speed rating, now suppose simple example you can do, a person can do the speed rating of 3 persons walking a distance of 20 metres or walking a distance of 15 metres, so the distance is now fixed, he can ask 3 people to

walk for 15 metres and see that at what rate and how much time they are able to perform the task or this task of walking this 15 metres, simple experiment.

Now, how you rate? Now, the person who is doing the time study, he will be able to see that as per his viewpoint, out of the 3 persons may be one may be walking slightly faster, the other may be relatively slower, the other one may be walking at a normal pace, so the normal pace is what is expected for a worker to walk for distance of 15 metres, so one may be faster, one may be slower.

It may so happen that all 3 are walking at the same rate only, so in that way, we can very easily try to understand the concept of performance rating by asking 3 people to walk may be number of times and you try to record the time taken for walking a distance of 15 metres and then you will be able to understand that yes, somebody is faster than the normal rate, somebody is slower than the normal pace at which a person must walk leisurely in this 15 minute; for this 15 metres.

So, there is no constraint on this person, there are constraint can be that you have to reach your destination early, so the pace this will change, he will start walking faster, so without any constraint leisurely if a person is asked to walk for 15 minutes, you can rate the performance of the 3 workers or 3 friends on whom we have to conduct these experiment, so the speed of the movement of a worker is only factor considered in speed rating.

Example; I have already told, rating personnel observers the movement of workers against a standard expected pace or speed and notes the relationship between them as a rating factor. Now, speed rating is given by the workers speed divided by the speed expected from the worker, now what is the speed expected from the worker? We see, which is the normal pace of walking these 15 metres as per the time study analyst.

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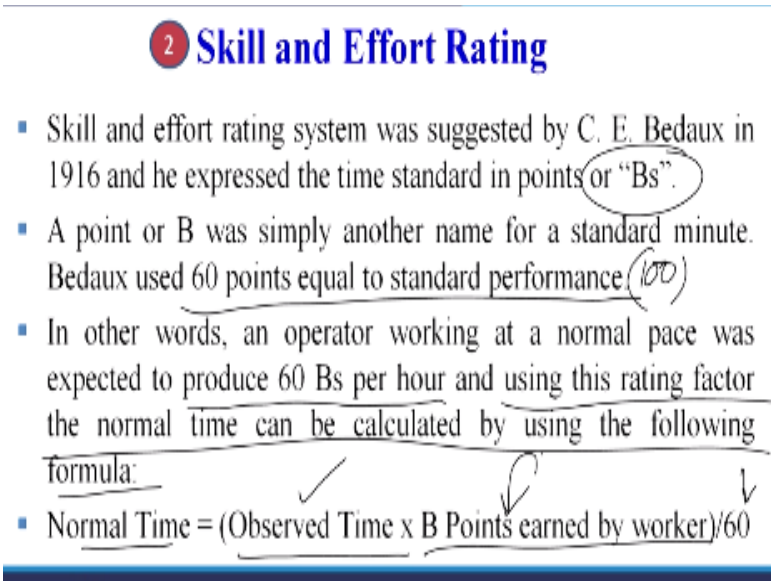

And the actual is the speed at which the worker is walking for this 15 metres as per the example. Now, skill and effort rating, this was skill and effort rating was suggested by C. E. Bedaux in 1916 and he expressed the time standard in points or Bs. A point or B was simply another name for a standard minute, Bedaux used 60 points = standard performance, so in our previous example we have seen the normal pace is identified by the number 100.

But here in skill and effort rating method or in this scheme 60 point = the standard performance, so that does not make a difference because it is a ratio, 60 may come in the denominator and in the numerator may be the rating that is given to the worker depending upon his rate of or his pace of working. So, he has use a 60 points equal to the standard performance, which was otherwise in previous example equal to 100.

In other words, an operator working at a normal pace was expected to produce 60 Bs per hour and using this rating factor, the normal time can be calculated by using the following formula, normal time that is what we want to calculate, observed time already we know into B points earned by the worker, B points earned, we have already seen what are the B points divided by 60, so 60 is coming in the denominator.

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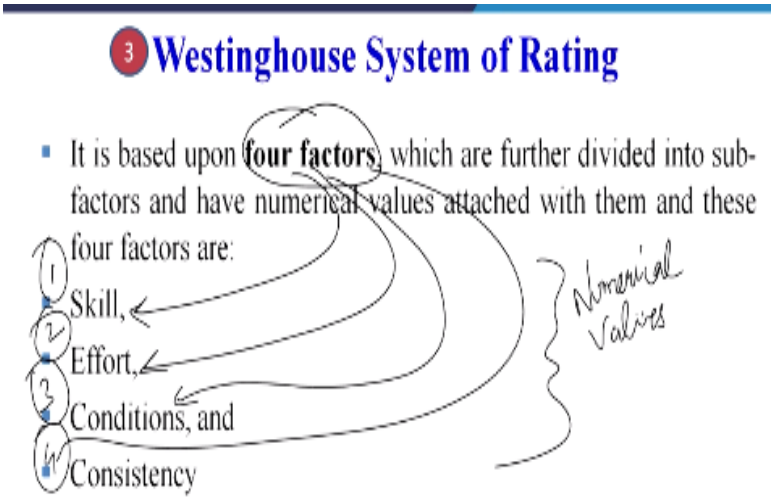

And in the numerator, we have the actual performance of the worker, now the third scheme is a Westinghouse system of rating; it is based upon 4 factors. Now, what are these 4 factors? This 4 factors are skill that is one, effort that is 2, conditions that is 3 and consistency that is 4, so it based upon 4 factors which are further divided into sub factors and have a numerical values attached with them and these 4 factors are already given.

So, these 4 factors that is skill, effort, conditions and consistency have numerical values associated with them and these numerical values we will find out depending upon our we can say, point of working a hour or pace of working like we as an observer as the time study analyst will give this numerical values based on the skill, based on the effort, based on the conditions, based on the consistency.

And then, these values will be added up and when we add up these values, these will help us to convert our observed a time into the normal time. 2 methods already we have seen, now this is the third method, now, what are the numerical values assigned to these factors that are given in the tabular form.

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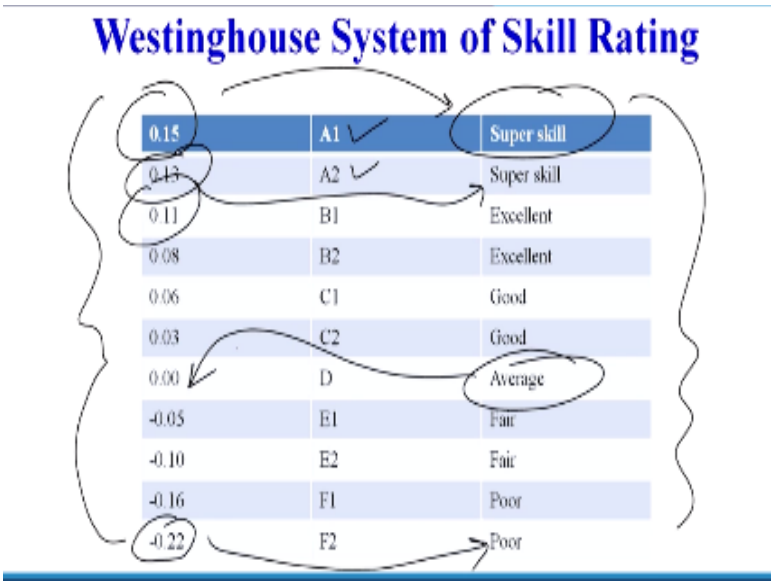

This is the Westinghouse system of skill rating, so this is you can see super skill, so if you go back to the previous slide, you can see skill is our first parameter, so this is super skills, so we give a value of 0.15 t0 super skill, then 0.13 to super skill that is A2, this is A1, then B1 is 0.11 and the last is -0.22 that is poor skill, so that is one parameter, these are the numerical values which will be taken from this table depending upon our rating of the skill which we feel.

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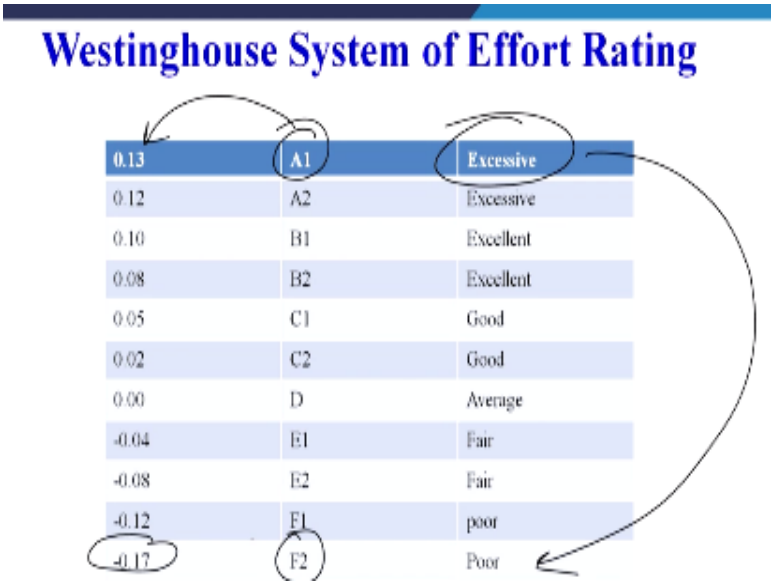

Suppose, we say, average skill the value will be taken as 0.00, the next one is the effort rating, we can see here also A1 is 0.13, which is excessive, then from excessive, the effort is poor and the for the values -0.17 and the designation is F2, so this way we have the tabular data available,

all these 4 factors which we have already considered, you can see these are the factors that we have consider skill, effort, conditions and consistency.

Based on this, we will find out the rating to be multiplied with our observed time to calculate the normal time, now these 4 will add up, we will take an example, these 4 will add up to give us a number and that number will be multiplied by the observed time to calculate our normal time. So, these 4 tables will help us to identify may be the rating related to skill, the rating related to effort, the rating related to conditions and the consistency.

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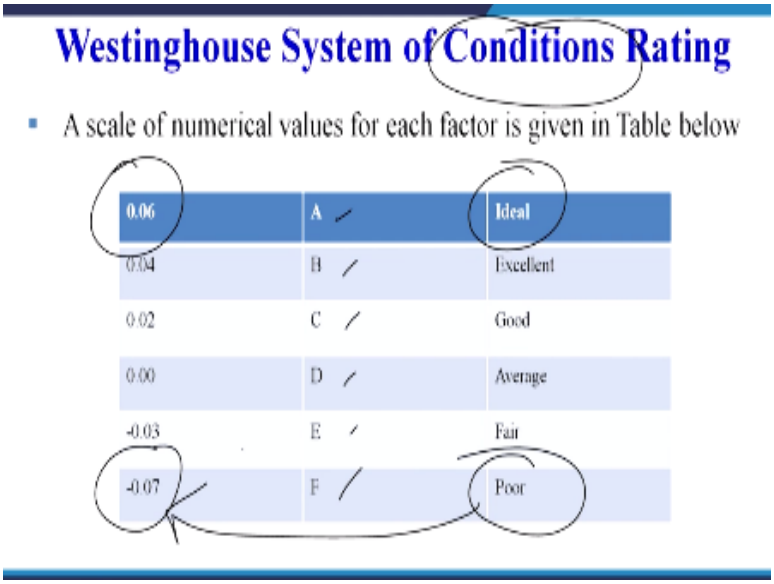

So, here 2 already we have seen, this is what is related to skill, this is one parameter, this is related to effort that is second parameter, this is related to conditions and in conditions also, we have A, B, C, D, E, F, so we can see they are numerical values associated with this. So, if the conditions are ideal, we will have 0.06 rating, if the conditions are poor, we will have -0.07 rating.

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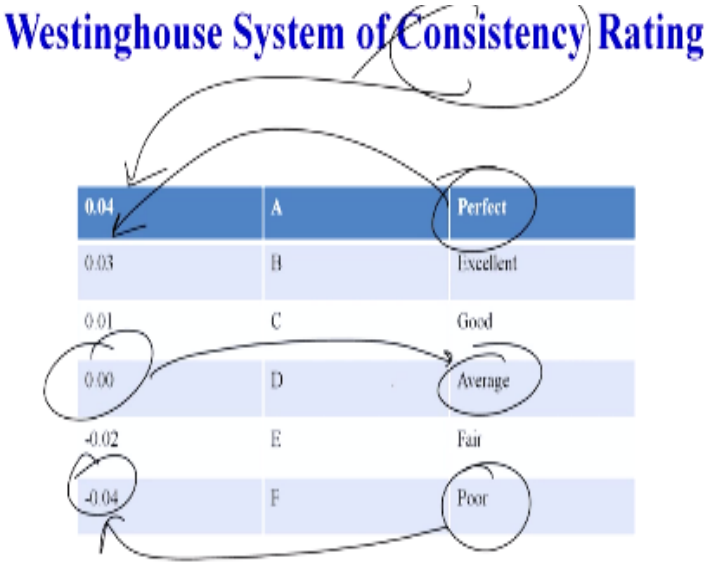

Similarly, the last one is the consistency, now for consistency also, we have the numerical values for perfect will a value of 0.04 and for poor, we will have a value of -0.04 and for average, you can see the value will be 0.00. Now, accordingly this; according to these values, we will add up these values with there are some negative values also, so the total sum we will take and we will take it as our rating factor.

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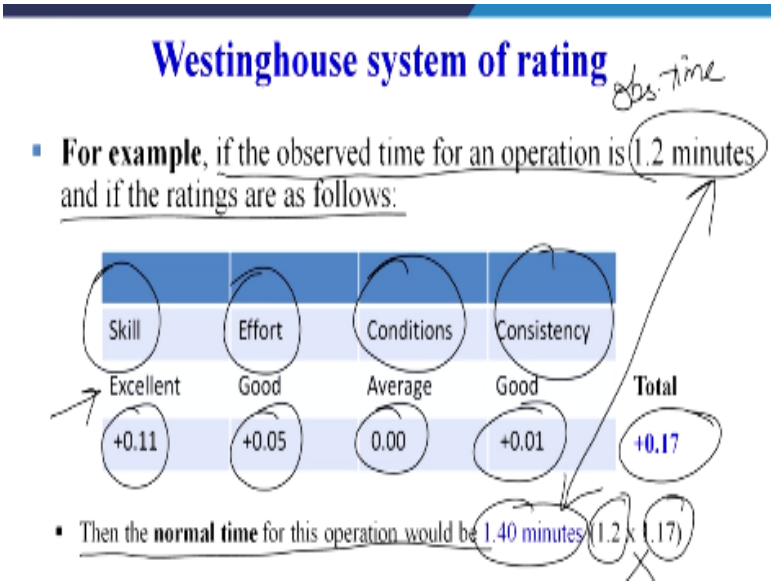

So, let us take an example now, for example if the observed time for an operation is 1.2 minutes, so this is our observed time and if the ratings are as follows. Now, we have seen 4 ratings; one is skill, it depends; Westinghouse system depends on 4 parameters; skill, effort, conditions and

consistency, so 4 factors are there. So, here the rating is given, skill is excellent, so +0.11, effort is good +0.05, conditions are average, 0.00, consistency is good +0.01.

So, we do the total that is 0.17, so what we will now do? It is in addition to may be the normal pace of working, this a positive value +0.17, so then the normal time for this operation would be 1.40 minutes, so the observed time was 1.2 minutes, the normal time that we have calculated as 1.40, how? Because 1.2 is the observed time, we multiply it by 1.17, which is the rating factor or that is the performance rating factor as per the Westinghouse system of rating.

So, this way also we can calculate the rating factor that how we can multiply our observed time or how we can convert our observed time into the normal time by rating the performance of the worker. So, now very easily we can conclude that what are the parameters that influence the rating factor, so parameters are the skill, parameters are related to effort, parameters are related to conditions, parameters are related to consistency.

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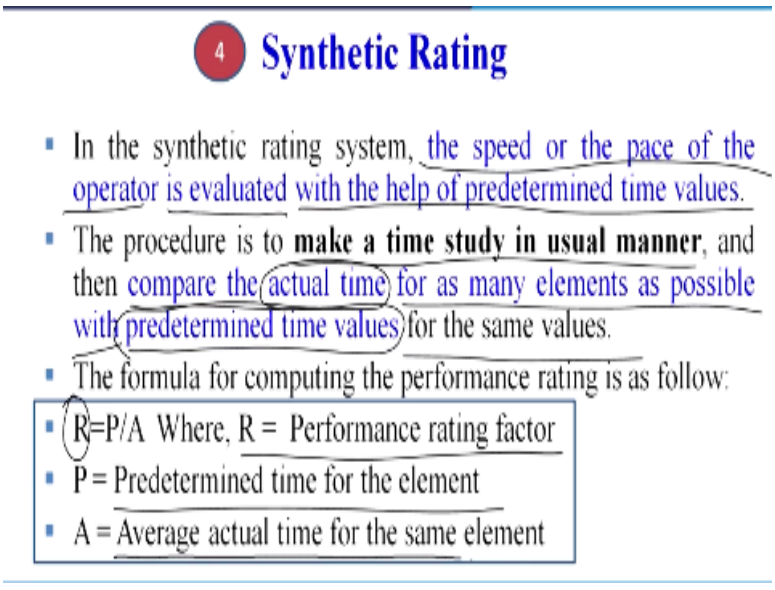

So, these 4 parameters will help us to find out a rating factor, which will be multiplied with the observed time to calculate the normal time. The next method is a synthetic rating method, in the synthetic rating system, the speed or the pace of the operator is evaluated with the help of predetermined time values. Now, what are these predetermined time values; we will try to understand in the next point.

The procedure is to make a time study in the usual manner but our is a standard procedure which we have covered in this week only that what are the various steps to be followed for calculating the standard time, first we have to find out the observed time by doing the direct observations, so that is the meaning of that. The procedure is to make a time study the usual manner and then compare the actual time that we are recorded experimentally for as many elements as possible with the predetermined time values.

So, here also the comparison has to be done, so in previous method also we have seen that there is a comparison, in case of Westinghouse we are directly giving the rating to the 4 factors and then summing up the rating and multiplying with the observed time but in the previous method, if you remember what we have taken, we have taken a ratio of the actual to the standard. So, here also we are doing the actual time, we are recording.

And we are comparing it with the predetermined time values for the same values, now the formula for computing the performance rating is as follows; rating R is = P/A, what is R? R is the performance rating factor, P is the predetermined time for the element and A is the average actual time for the same element, so we have a predetermined time available with us already and then we record the actual time taken for completing that elemental work element and then we compare that 2.

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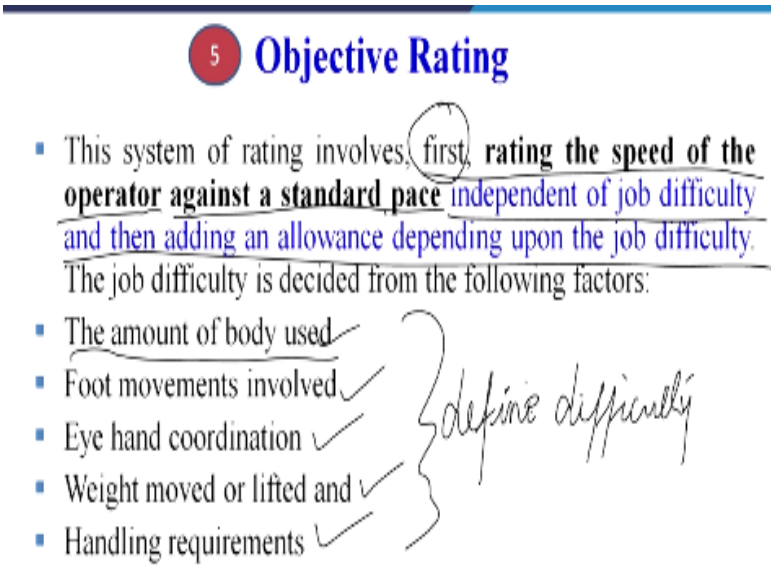

And thereby, calculate the rating factor, the objective rating technique, you can see this system of rating involves first, rating the speed of the operator against a standard pace, you can see; rating the speed of the operator against a standard pace independent of job difficulty and then adding an allowance depending upon the job difficulty. So, what is the meaning here? So, if you try to understand and try to divide this sentence into 2 sentences, what we are doing?

Firstly, what we are doing? Firstly, we are rating the speed of the operator against a standard pace which normally we are doing, independent that is without any job difficulty, so what we are doing, we are rating it without giving any weightage to the difficulty involved in performing the job and then later on the second stage, adding an allowance depending upon the job difficulty.

Now, if suppose the job is very, very difficult, we will give some allowance to the factor or we will give some allowance while defining our ratings factor. The job difficulty is decided from the following factors, how we will say that the job is difficult or easy, so it will depend upon the amount of body used, maybe if in case we are using both hands, both legs, so maybe it may involve the body more, effort is more.

So, there we can say the job is slightly difficult, foot movements are involved or not, eye hand coordination, weight moved or lifted and handling requirements, there can be other parameters also, so these will basically have defined the difficulty of performing the task, so these will

define the difficulty, these parameters. Now, once we know any of these parameters are involved in the job performing the job whatever standard method we have use, we will add some allowance into those values and then we will set our rating factor.

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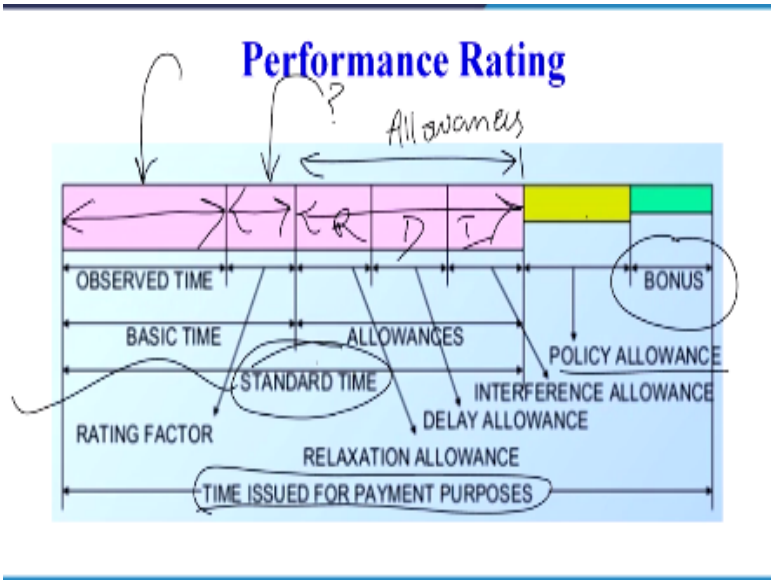

So, we can see finally the performance rating, how it will be helpful to us, now this is the observed time, if you can see on your screen, this is the observed time that directly we observe may be using a stopwatch, then there is the rating factor, this is a rating factor that we are seeing that whether we are using objective rating technic or synthetic database rating or the Westinghouse rating system or the normal speed rating system.

So, any rating system we are using that is going to give us this thing that is a rating factor, this is the thing or this is a value that we are trying to understand today; in today's session, then we add some allowances, these are the allowances, these 3, this is the delay allowance, this is the delay, this one is the relaxation allowance and the last one is the interference allowance, so we will add different type of allowances which we will cover may be in our subsequent sessions.

Then, the policy allowance is there, this one and then the bonus, so this is the total time issued for payment purposes, so what we have seen? We have just try to understand in this week that how we can calculate the observed time, what are the various tools and techniques or equipment

that can be used and today we have seen the rating factor. In subsequent sessions, we will focus on the allowances also.

And then, thereby we will see that how the standard time is calculated, here it is standard time which is made up of the observed time, the rating factor and the allowances, so this is our target, with this I conclude the today's session, in next session we will try to take certain problems related to performance rating. Thank you.