Management Accounting
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Lecture 31
Variance Analysis

Welcome students, so we are in the process of learning about the Standard Costing, as a tool of management decision making. And in the previous class we discussed about, we learnt about that, what is the Standard Costing and some important concepts about the Standard Costing and what are the requirements, what are the, say, you can call it reasons of rational of Standard Costing, how it can be used as a tool of, say, controlling the cost and facilitating the management decision making, especially with regard to the controlling of cost.

Right, so after this conceptual discussion, now we will learn about that what are the different variances, that can be calculated or we can calculate or we can find out and then, once those figures are available with us, all variances are available with us, then we will learn that how to analyze those variances, and how to use those variances for the day to day decision making or may be, with regard to the, say, decision making with regard to the cost, right?

So, I told you in the previous class itself that, largely the variances are of 3 types: Material Variances, Labour Variances and Overhead Variances, right. So, in the Material Variances, now first we will learn the Material Variances that what are the material variances, how to calculate those material variances and how these material variances can be useful in controlling the cost. So, I have told you that in the Material, we have the 5 kind of the variances or we can calculate 5 kind of variances and we will learn them, how to calculate those variances and then the further discussion on that.

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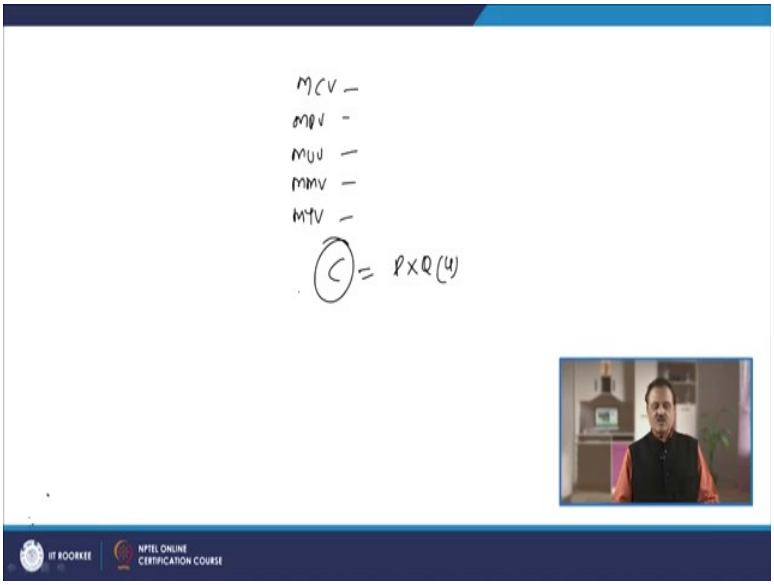

So, material variances are like, say 5, material cost variance. Material Cost Variance, this is MCV, Material Price Variance that is MPV, Material Usage Variance that is MUV then Material Mix Variance that is the Material Mix Variance and finally the Material Yield Variance. So, when you calculate these 5 variances, what is the objective, what we intend to find out and how we can calculate these variances. So, as the name indicates, Material Cost Variance, so we are going to calculate this variance between the two cost, that is the Standard Cost and Actual Cost.

Once we have calculated the Standard Cost of the material then we will go for the actual production and buying the material then going for the actual production and then finding out that what means was the say, predicted price or anticipated price or the standard price as well as the quantity of the material required for manufacturing the 1 unit of production of the total production. So it means price and the quantity makes the cost.

So what was the Standard Cost of the material and what is Actual Cost of the material so how much material we have consumed, how much we are intending to consume for manufacturing the desired amount of units and how much actually we have paid the cost. So this is the variance between the Standard Cost of material and the Actual Cost of material and then we calculate the 2 further variances which mix in total makes the first one; Material Price Variance.

So, Material Cost Variance is basically the function of Material Price Variance and the Material Usage Variance. This is called as the Material Quantity Variance also. Material Usage Variance or Material Quantity Variance, these are the 2 variances. So you understand that what is the actually cost, cost is basically the function of price and the quantity or the usage. So first we will calculate the Material Cost Variance C, which is called as MCV then we will calculate the Material Price Variance and then we will calculate the Material Quantity Variance or the Usage Variance.

And then we will sum it up, so you will be able to arrive at this cost that is the Material Cost Variance. So, Material Price Variance is basically what? What is the Standard Price of the Material and what is the actual price of the material. Because when we prepare the Standards, we know that what could be the possible price which we have to pay for buying the material then actually we will be going to the market or buying the material for the production requirement.

We anticipate a price on the basis of different surveys, different information and say market information available and on the basis of that we can find out that if we buy the material during the season or may in bulk or may be from the source, then what price we have to pay. So, as per our requirement we decide the supply source, if we are going to buy the material in bulk, we can directly contact the manufacturer of that raw material or the supplier of that raw material. If we are manufacturing in the small quantity then we can contact some distributors.

So we have to find out the price that what could be the possible price, Standard Price for buying that material or the 1 unit of material and similarly for manufacturing the, say, finished unit, 1 unit of the finished product, how much quantity is required. For example, 4 units of the raw material are required to manufacture the 1 unit of the finished product. So, it means the standard quantity is the 4 units for manufacturing the 1 unit of the finished product.

So it means, then we will, after calculating the material price variance, we will calculate the material quantity of the Material Usage Variance and then we will say sum it up so it will become the Material Cost Variance. So, for this means the quantity variance is basically the variance between the Standard quantities required for the 1 unit of the product that is finished product. And the actual quantity we have used, so we have to find out the variances that Standard was say 4 unit for the 1 unit, actual it may be 6 units for the 1 unit.

So, why we have used 2 units extra and whether it was because of the wastage or because of the inferior quality of the material or may be our standards were not correct, any reason it could be, we have to find out that reason and we have to remove those variances. After that we will go for the Material Mix Variances. Material Mix Variances is basically the Variance with regard to the mix of the different type of materials.

In, say, different industries are manufacturing different products, sometime one type of raw material is not sufficient. We use the multiple type of raw materials and we make a mix of different types of raw materials and then we go for the actual buying of that mix from the market and using that. So, we will find it out what was the standard mix of the material, what is the actual mix of the material and is there any difference, is there any variance in that standard mix and actual mix and lastly it is the yield variance.

Yield variance is that, say, we calculate the yield also and this variance is basically between the actual yield and the standard yield. What is actual yield, we have received from the given input, how much is the, how much was the standard yield expected from that given amount of input and what is the difference between the two. So, these 5 variances we will calculate and then we will try to find out that why these variances are there, even negative, even positive.

We will have to analyze these variances both positive and negative, try to find out the reasons for that, if they are beyond the level of the threshold or the minimum basic rule of thumb. As I told you may be sum in certain percentage or in the absolute values and then we will have to calculate the variances and then we have to analyze them, to find out the reason for those variances so that those reasons can be isolated and can be removed. So, now we will go ahead the learning of these variances and the formulas, about the calculation of these variances.

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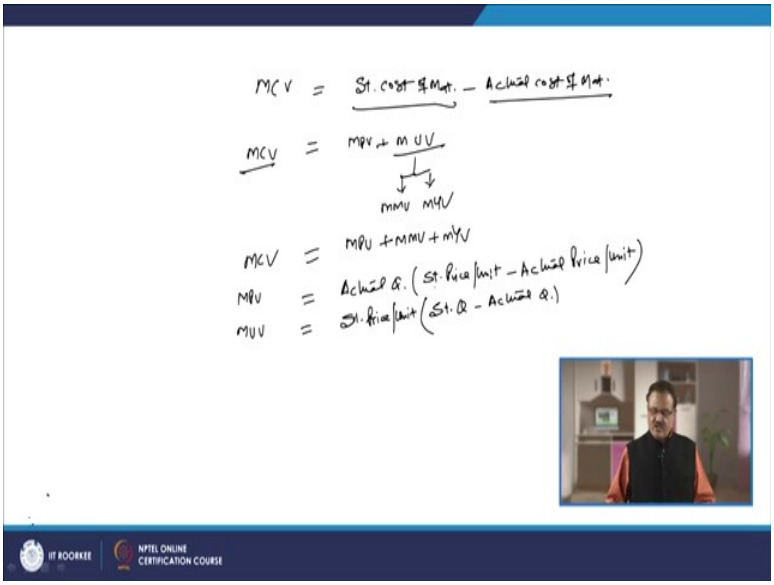

So, how to calculate these variances? First is the Material Cost Variance which is called as MCV. MCV can be calculated as Standard Cost of Material, Standard Cost of Material minus Actual Cost of Material, Actual Cost of Material. This is the variance, Standard Cost of Material minus Actual Cost of the Material. So, what is the Standard Cost and what is the Standard Cost we have paid this is the variance we have to find and that will become the MCV that is Standard Cost of the Material minus Actual Cost of Material.

This variance can also be calculated in 2 ways. As I told you that cost is basically the function of 2 things that is material price of the usage variance. So, the material cost variance can otherwise be equal to the MPV plus MUV, MUV that is the Material Price Variance plus Material Usage Variance and finally, you can further dissect this Material Usage Variance also and Material Usage Variance is basically the function of, Material Mix Variance and the, Material Mix Variance and the Material Yield Variance.

So one way of calculating the Material Cost Variances is, straight way you calculated by calculating the Standard Cost and the Actual Cost. So, it becomes the Material Cost Variance. Second way it could be that you can calculate first the Material Price Variance and the Material Usage Variance and then you sum these two up and it will become the Material Cost Variance. Or the other way could be that you calculate this Material Price Variance as I told you plus

Material Mix Variance and Material Yield Variance. So, this will also become the Material Cost Variance.

So either way you can calculate these variances and finally once we have these values of the variances with us, we will analyze these variances and try to find out the reason for those variances. So this is the first variance. Now we will go for calculating the second variance that is the Material Price Variance. Now Material Price Variances, how we can calculate it; so it means Material Price Variance can be calculated as actual quantity into standard price per unit of material, standard price per unit of material minus actual price per unit of material, actual quantity into Standard Price minus Actual Price.

But the Standard Price and Actual Price has to be per unit, we have to calculate as per unit. Then the Material Usage Variance and when you calculate the Material Usage Variance, this is the Standard Price per unit Standard Price per unit into Standard Quantity, Standard Quantity minus Actual Quantity, Standard Quantity minus Actual Quantity. So, these are the 3 variances: Material Cost Variance, Material Price Variance and the Material Usage Variance or the Material Quantity Variance.

So, Material Price Variance is actual quantity into Standard Price minus, Standard Price per unit minus Actual Price per unit and Material Usage Variance is Standard Price per unit that is outside the bracket and inside the bracket is Standard Quantity, total, that is the Standard Quantity in total which is purchased or which was expected to be purchased and actual quantity which is purchased. So this is the variance between the two.

So, if you look at this formula for the purpose of memorizing these formulas, you can see in case of Material Price Variance, quantity is outside the bracket and price per unit that is Standard and Actual is inside the bracket and in case of the Usage Variance, price per unit comes out and the Standard and the Actual quantities are inside the bracket. So, you can find out the basic difference is what is inside the bracket? What is outside the bracket and how to calculate these 2 variances and about Material Cost Variances, I have already talked to you.

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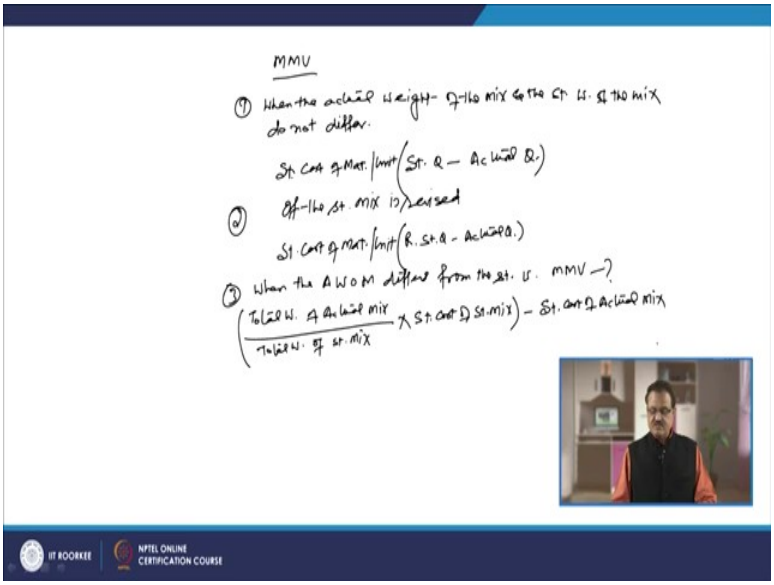

Now we talk about Material Mix Variance. Material Mix Variance can be calculated in the 3 different ways. Material Mix Variance as I told you that when we use multiple type of materials for manufacturing the 1 unit of the finished product so then the Material Mix Variance becomes important. For example, there are certain industries like Pharmaceuticals, when we manufacture drugs we use multiple types of materials. Similarly, the chemical industries, paint industries, where for manufacturing the 1 liter of the paint, multiple types of the raw materials are used, mixes of the material are used.

For manufacturing 1 drug, converting that molecule into the usable drug, we have to use multiple type of the material for manufacturing the 1 drug. So, it means we have to create a mix of the materials, to use that mix for manufacturing the finished unit, 1 unit of the finished product. So it means this mix variance is more important in manufacturing sector where the multiple materials are used to the 1 unit of finished product. So, what is material composition, what is material mix and how to use it, we will be doing that. So, in this case material mix variance, we have 3 situations for calculating the material mix variance.

The first situation is, when the actual weight of the mix, first case when the actual weight of mix, when actual weight of the mix and when the standard weight of the mix, when actual weight of the mix and when the standard weight of the mix do not differ, do not differ. So, for example, the Standard weight we decided, that we will be using the 450 kg of the raw material for

manufacturing the 100 units of product and the actual weight and Standard Weight is different, sorry same, there is no difference in Actual and Standard Weight but there may be difference in the composition of the different materials.

So one product which one material which we thought of using in 10 units, now we have reduced that to 5 units but the other has been increased by say same 5 units, so total weight is remaining the same, but the proportion has changed. So, in that case if there is any difference comes up in the standard mix and the actual mix but the total weight is remaining the same, but the mixes have changed, the composition has changed in that case we will have to calculate the variance. And if that is the case how we calculate this variance in this first case, when the actual weight of the mix and standard weight of the mix do not differ.

So, it means in this case what is the material mix variance, Standard Cost of material, Standard Cost of material per unit, Standard Cost of material per unit into Standard Quantity minus Actual Quantity, Standard Quantity minus Actual Quantity, this way you can calculate the Material Mix Variance. Standard Cost of Material in Standard Cost of Material per unit into Standard Quantity minus Actual Quantity. So this is a very simple way of calculating the Material Mix Variance in a situation when the proportions may change, mixes may change but the weight is same and we have not changed the weight. So it means you can calculate the Material Mix Variance, this is the first case.

Second case is that, if the standard is revised because of any reason, there might be a possibility, that the one category of the material is not available, so we have to use the more material of the other 2 categories or the other 3 categories or the first 2 categories of the material are not available, in that quantity, in that desired quantity. So, we have to reduce the say proportion of that first 2 categories of the material and we have to increase the quantity of third and fourth category of material.

So, in that case what will be done, we will have to revise the standards, we will have to revise the standards. So because proportion is changing, material is not available in market, we wanted to have the best mix, but best mix is not possible because all the materials required in desired quantity, that is not available. So if that is not available then what to do, we have to revise the

standards. So, it may be possible that material 1 and 2 have to be reduced in the quantity and the use of the material 3 and 4 has to be increased.

So means, ultimately means the standard is revised and when standard is revised but the weights are again same, they are not changing so it means, in that case if the Standard is revised. In that case what will be the Material Mix Variance? If the Standard is revised that is the, if the Standard Mix is revised because of the shortage of the any one type of the material, in that case how will we calculating the variance, Standard Cost of Material, Standard Cost of Material that is again Standard Cost of Material here that is Standard Cost of Material per unit into Revised Standard Quantity minus Actual Quantity.

So, that we have to do for finding out the Material Mix Variances this is the another requirement. Now, we go for the next variance in the Material Mix case or finding out the Material Mix Variance and in that case how to calculate it. And that is third case is, the third situation is say when the actual weight, the actual weight of material differs from the Standard weight in that case how to calculate the material mix variance, right if the actual weight of material differs from the Standard weight of material. It means in this case we have changed the proportion also and now the weight has also differed.

Standard weight was, for example, 500 units or manufacturing the 100 units of the finished product, but actually that is such standard. But if you go for the actual, the actual has become 600 units for manufacturing again the 100 units of finished product. Now, it means the 2 weights are different the Standard Weight is different, Actual weight is different and if that situation occurs, if that differences comes up, then how to calculate these variances, that is Material Mix Variances and the Actual Weight and Standard Weights of the materials or the material mixes differ.

So how to calculate those variances, the formula is total weight of Actual Mix divided by Total Weight of Standard Mix into Standard Cost of Standard Mix minus Standard Cost of, Standard Cost of actual mix, Standard Cost of actual mix. Total weight of Actual Mix divided by Total Weight of Standard Mix into Standard Cost of Standard Mix minus Standard Cost of actual mix. With the help of this formula, you can calculate the Material Mix Variance. So we have seen the

3 situations when the actual weight of the mix and the Standard Weight of the mix do not differ, then how to calculate the Material Mix Variance.

Second case is, if the Standard is revised, if the Standard Mix is revised because of the shortage of the 1 particular type of the material or the 2 types of the materials, how to calculate the Material Mix Variance and when the 2 weights that is the actual weight and the standard weight of the mixes differs then how to calculate the variances, then these are the 3 formulas in the 3 situations and we can use these 3 formulas to calculate the Material Mix Variances.

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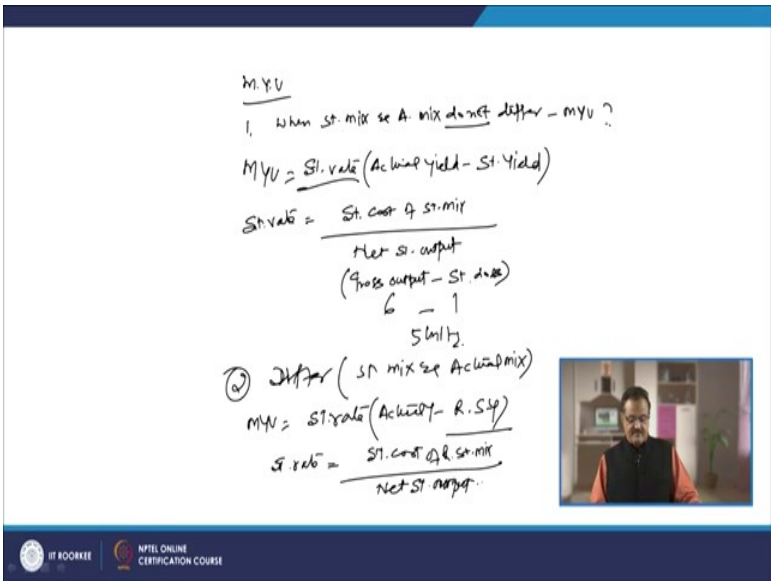

Now, we will go for the next one and the last variance that is called the Material Yield Variance MYV, Material Yield Variance that is called the MYV. So, in this case there are the 2 situations, first case is means first case of calculating this variance is when the Standard and Actual weight of the mix do not differ, when Standard and Actual weight of mix do not differ how to calculate the Material Yield Variance and then second situation will be when there is a difference in the Standard Mix and the Actual Mix then we will have to, how we will have to calculate the variance.

Because what will happen, it may be possible that if means when we have created the first situation then what was our Standard Mix, what was the Actual Mix they are same. Standard Mix was same, for example, the 2 units of material A, 3 units of material B, 4 units of the material C

and 5 units of material D, there is a Standard Mix, right. We have used the actual mix also in the same proportion and then we would want to find out that for the given unit of that total input of the Standard as well as actually used, what is the yield available, what is the output of that mix.

For example, due to shortage of these material, any of these 4 material A, B, C, and D or 1, 2, 3, and 4, if you have to revise that proportion, that now in case of that for the 2 units of product A, you have to use the 3 units of the product A. But in case of the 3 units of product B, we have to reduce it into 2 units of product B. So, it means what will happen, the weight will remain the same, but the proportion has changed.

Means the proportions has changed from A, B, C, D to say again from the 2, 3, 4, 5 units to may be 3, 2 then it is 5 and 6 units. So what will happen then we can expect that there might be effect of this change in the mix, on the yield or on the actual output. So we have to find out the yield variance in 2 situations. One situation is the Material Yield Variance, when the Standard Mix and Actual Mix they do not differ, then how to calculate the Material Mix Variance and in second case, when they differ, the mixes differ, how to calculate the Material Yield Variance.

So the formula here is Material Yield Variance is Standard Rate, it is Standard Rate into Actual Yield, Actual Yield minus Standard Yield, Actual Yield minus Standard Yield is the Material Yield Variance and for this, now how to calculate this thing that is the Standard Rate. This is the Standard Rate, how to calculate the Standard Rate? Standard Rate is the, Standard Rate is the, Standard Cost, Standard Cost of Standard Mix divided by the Net Standard Output, Standard Cost of Standard Mix divided by the Net Standard Output.

So, this is called as the Standard Rate, so what is the net Standard Output, Standard Output is the Gross Output, Gross Output minus Standard Loss, Gross Output minus Standard Loss which is called as the Net Standard Output. Standard rate that is the Standard Cost of standard mix, Standard Cost of Standard Mix, Standard Cost of the Standard Mix divided by the next Standard Output and what is the next Standard Output that is the Gross output. See what can be there, possibility that we have given the Standard input 2 units, 3 units, 4 units of A, B and C products that are the raw materials.

And we expected that if we give this much of input say that we be give 20 units of the input, we should expect it, say 18 units of finished product, because 20 will not give you the 20 units of the

finished product or for example, 20 units of the input for manufacturing the 1 unit of the finished product. 20 units of the different Product A, B, C and D, you are using to manufacture the one, one unit of the finished product. So, it means for manufacturing the 5 units of the finished product, you have to give how many units of the input, that is the 100 units of the input of the 4 different categories of the material that is A,B,C and D to get the 5 units of the output.

So, it means how we are calculating the 5, we are finding out that it may be possible, that out of the total input, some input will be wasted and finally after means adjusting the wastage for everything, we will get the net output that will be with the 5 units. So that is why we are talking about here is Gross Output, Gross Output, it may be possible that is the 6 but one there will be standard loss because in the manufacturing process, some of the material will be wasted. So the net output will be finally the 5 units, this will be the 5 units, so you have to adjust for the losses also.

There are some anticipated losses that all the inputs cannot be converted into output, during the process, some material is lost because of wastage, which are the standard wastage, the expected wastages. So if that situation is going to happen in that case, we are going to find out, that the Net Standard Output will be Gross Output minus Standard Loss and after adjusting for this Standard Loss from the Gross Output, the next Standard Output can be found out and for Standard Rate it will be Standard Cost of Standard Mix by the Net Standard Output, so this is the Material Yield Variance.

In a case when there is the Standard Mix and Actual Mix do not differ. Now, you talk about the second case, that in the second case, if actual mix is different from standard mix, if the actual mix is different from the standard mix, so it means as I told you that we are using the 4 inputs A, B, C and D, 2 units of A, 3 units of B, 4 units of C and the 5 units of D but due to shortage of any kind of material, may be A is less, so B has to be increase, C has to be reduced and D has to be increased it may be possible and if that situation occurs, so it means that mix is differing.

Now, Standard was something different, Standard was 2, 3, 4 and 5 units of A, B, C and D. Actually, it has now has become different because of the shortage of any type of material. Now A is 3 and B is 2 and C is 1 and D is 4. So, ultimately total weight is remaining the same, proportion have changed to get the 1 unit of the finished product. In that case when Standard Mix

and the Actual Mix differ, I used the word here, ‘do not differ’ but now the second case is, we are using the differ that is the differ, what is differing here is that is, the Standard Mix and Actual Mix.

They differ with each other, so in that case, how will be using this variance for calculating this variance. Now, for in this case what we will be doing that Material Yield Variance will be Standard Rate, again the Standard Rate will remain the same. The Standard Rate into, it will be the variance Standard Rate into Actual Yield, Actual Yield minus Revised Standard Yield because when the proportion is changing, yield will change. When the proportion is changing yield will change. So, it means it is the Standard Rate that is Standard Rate into Actual Yield minus Revised Standard Yield, so we have to revise the standard yield because of the revise of the Standard Mix.

Standard Mix has changed among the Standard Mix to Actual Mix, they are different. Standard is different, Actual is different, Standard was as I told you 2, 3, 4 and 5 units. Actual is in the different proportions we have used of the A, B, C and D to get 1 unit of the finished product in that case, there will be some possible difference in the actual yield, it may increase or decrease. So we have to calculate this yield variance by a formula, Standard Rate into Actual Yield minus revised Standard Yield and in this case the Standard Rate will also change, Standard Rate will also change.

So, how will you calculate the Standard Rate? Standard Rate will be the Standard Cost of, Standard Rate will be the Standard Cost of, Revised Standard Mix Revised Standard Mix divided by the Net Standard Output, divided by the Net Standard Output. So, it will be now Standard Cost of the Revised Standard Mix divided by the Net Standard Output, so we have the revised standard because of the non availability of the certain type of material.

So, these are the 5 variances Material Cost, Price, Usage, Mix and the Yield variance, how to calculate these variances we have note this formula, these methods and now we will apply these formulas these methods to some problems, we will now in the next class, will discuss some problems, where we will calculate the variances, we will learn how to calculate variances and once those variances are available with us, those figures are available with us then we will learn how to analyze those variance, how to analyze those variances. So, for that remaining other

things with regard to the variances and solving some problems, with regard to the related to the material variances, I will discuss in the next class. Thank you very much.