Business Analysis for Engineers
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Lecture-18
Cost-Objects

Last class I just gave you the broad definition of cost and we need to understand that the definition of cost is for a cost object. So, what is the cost object cost object is just the technical term.

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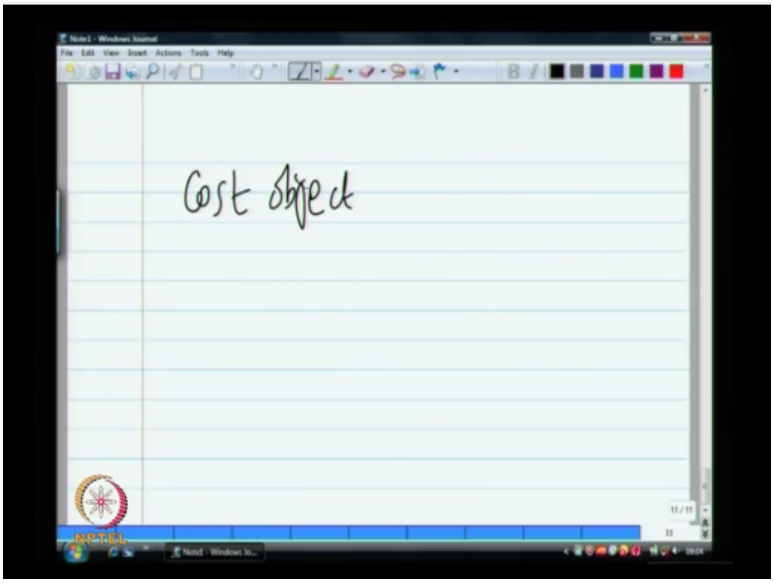

That we used just a technical term for the product or for the business activity or an organisational unit or any purpose for which we are measuring the total cost is the cost object. And it has a context suppose we say manufacturing a particular type of car. That particular type of car is a cost object or the total cost involve in running the entire automobile plant in which this car is a part of that can also be a cost object can be as broad as the entire pant itself or it can be as narrow as one particular product that comes out of the plant.

So, the extent to which you either go very narrow or make it broad determines the actual cost that you are going to calculate, because the cost object is differing based on your requirement. But whatever the case maybe we need to measure the full cost of the cost object to cost of the

cost object. It means all the resources that the cost object consumes in it is creation is the full cost of the cost object.

In some cases it can be easily measured let say you get into a shop and you purchase a pair of jean for 1000 rupees the full cost for you is 1000 rupees. Let easily measurable because we just pay that 1000 rupees suppose the question is what is the full cost of manufacturing that jeans, then you need to look into various other components that get into the full cost of manufacturing jean, in this case the jeans the pair of jean is the cost object.

Now to do that we need to understand that this cost is divided into 2 broad categories namely the direct cost and the indirect cost, direct and indirect cost**.** So, the direct cost of a cost object or all the items that can be specifically identified and tagged on to be cost by this cost object thus the direct cost. For example we are talking about manufacturing a particular type of jeans. The fabric or the denim that is used in manufacturing a batch of jeans is a direct cost of that batch of jeans.

As against indirect cost which could be one or more of certain cost types where it is not feasible to trace each of them individually to a cost object in the same example. The salary of the employers or the Insurance that is being paid for the jeans factory these are the indirect cost definitely a part of with goes to this. But we cannot trace it in exactitude that it is because of this cost object. But also we must understand that in this example that I have sighted.

The cost object here is a explicitly stated that it is a batch of jeans. If the cost object let us say changes and say that the cost object+the entire factory where the jeans are produced. Then the employer's salary the Insurance that I pay for the factory is a direct cost. Because here the cost object is the factory itself and it can be traced to the cost object. Because the cost object is the factory so, we need a context to define the cost object.

And all costs that can be traced to this cost object or it is direct cost and all cost that are been incurred but not being be able to trace to a particular cost or the indirect cost. And we will understand it more when we actually split this into finer components and how do we do that. The most common cost object of any business is a product any business engages in delivering a

product or rendering a service. So, it could be a product or a service that is the most common object.

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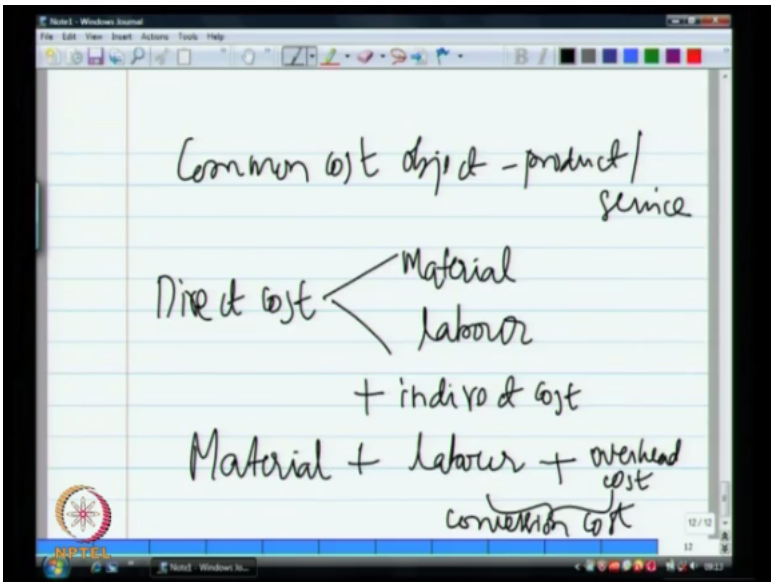

So, the common cost object for the purpose of our discussion is a product or a service. So, product because it is a tangible that could be a intangible cost objects if you are rendering a service. So, we need to understand the product costing system how cost are allocated to the cost object. And the most commonly used or the common components of the costs I told you before to easily identifiable direct cost components are the material and labour.

So, direct material cost is that quantity of material that can be specifically identified to the cost object. In an economically feasible manner which means that I am able to express it in monitory terms because I know that this much amount of material has been consumed in producing this particular cost object. So, that is the direct material cost and in variably you would take the raw materials at you actually use consume to make this cost object as your material cost.

And likewise you are direct labour cost will be all the labour quantities that can be easily attributable that can be identified specifically for creating this cost object. And how do you monetise this to just know the number of hours that is being consumed. And what is the rate that you are paying for the labour hours that is being consume and hence it can be converted into monetary terms.

And this you will be specifically able to identify to a particular cost object. Because you know for this particular cost object you are consuming this amount of labour which costs some amount X per hour or whatever is the unit that you are using. So, the most commonly used direct costs are the direct material cost and the labour cost and other cost in addition to these are the indirect cost which invariably we call as overhead costs to cost of running the unit.

The cost that are not easily identifiable in definite measure to a particular cost object. Now typically if you look at this material+labour+overhead or your indirect cost overhead cost with respect to let say the production activity. Because there are other overhead cost outside the production activity that is your general selling expenses administrative expenses that we look at it later, now this your conversion cost.

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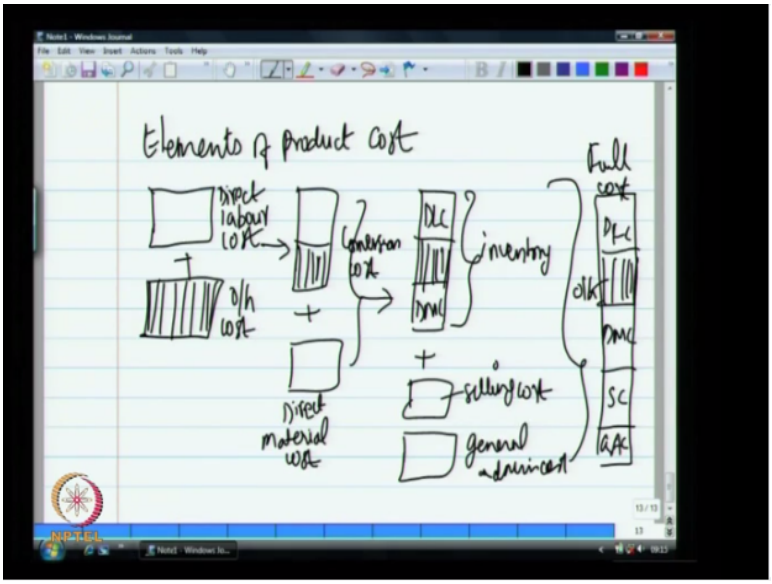

So, if you look at the cost components the elements of product cost for a finer understanding I will just split the is into let us say this is your direct labour cost, this is your overhead cost this+this is your conversion cost as I said before, your conversion cost+ let us say this is direct material cost. So, this+this will give you the full cost direct labour cost, conversion cost, direct material cost.

And if we look at your account that we learn before this is what gets in sits as your inventory and it is after you incur some selling cost and some general admin cost, this is also form of overhead actually. All this put together will be your direct labour, this one was your overhead, production overhead, this one was material cost, selling cost, general administrative cost. So, all this put together will be the full cost.

So, this you just have as an imagery for you to understand that any cost object will have 2 major components direct cost, indirect cost. And very typically cost that are associated with either conception of material or labour can easily be identified to that particular cost object and hence there is direct material cost, direct labour cost and then the generic overhead cost which will be spread over different cost objects.

And all this put together will give you the full product cost of the cost object. Now with this understanding let us begin to understand what standard cost is.

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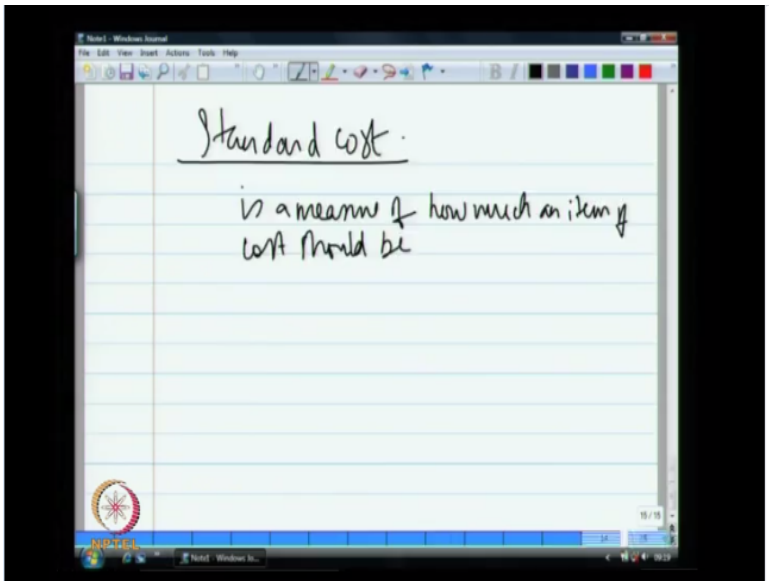

Now standard cost is a measure of how much an item of cost should be as against how much it actually was, it is more or less equivalent to budgeted cost expect that standard cost is for a unit cost product whereas budgeted cost is for the total number of such cost products that are being produced. Now let us say we would like to understand what is the standard cost of a cost product

which means I need to understand what is the unit cost, the unit full cost of producing 1 unit of the cost product, that is the standard cost.

And typically just like when you see a recipe to cook some dish they would say take so much of this quantity so much of this quantity do something and finally you prepare something just have this in your mind and if the units that are been consumed in making that dish has some monitory value then you are consuming material and the person whose preparing that also consume some time and then he is paid for that, then there is monitory value in the labour that is being consumed.

And the fuel or the place in which is working as a cost of operation then there is also this overheads to this. So, you are able to add directly identifiable material cost, directly identifiable labour cost and that component of an overhead cost and all them together to produce 1 unit that is the unit standard cost. And typically if you get into a manufacturing setup I will just give you an example of a standard cost sheet.

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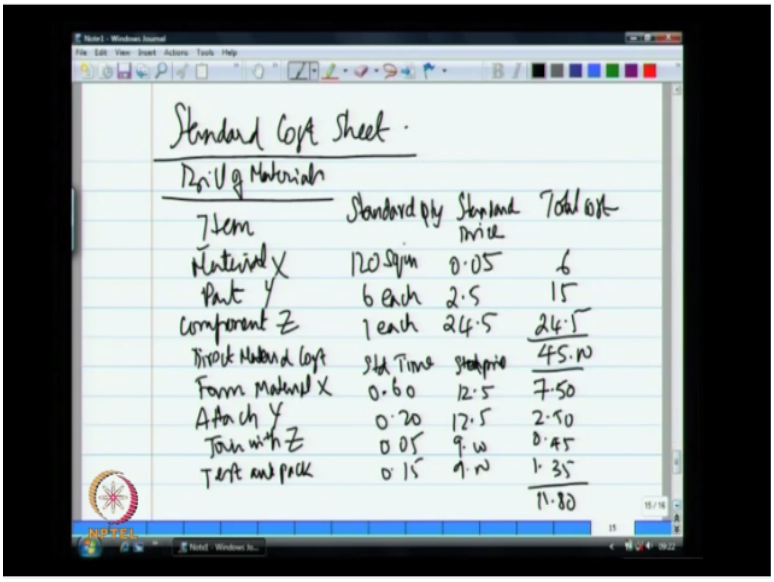

So, if you go to a manufacturing setup you will have a bill of material let us say I use this item material X, part Y some component Z right. So, this standard quantity that I would be using to produce 1 unit of that material I first right. So, this standard quantity of material X that I require

let us say this is 120 square inch then 6 units and 1 unit of component Z. And all this standard quantity is available for a standard price.

Let us say this is 0.05, this is 2.5, this is 24.5 as a result of which the total cost is 6, 15, 24.5, so my direct material cost is 45. Then when I get this material I will have to process this material. So, let us say I have to do some forming of material X then I attach Y join with Z, test and packet. Now these are labour operations, so I am talking about time let us say there is some standard time for this and standard time and standard price for this.

Now to form this material I need to consume 0.6 hours at a price of 12.5, so the total cost of labour for this particular operation is 7.5. Likewise let us say I am consuming different amounts of time at different rates to calculate the total labour cost that is involved, so this comes to 11.8.

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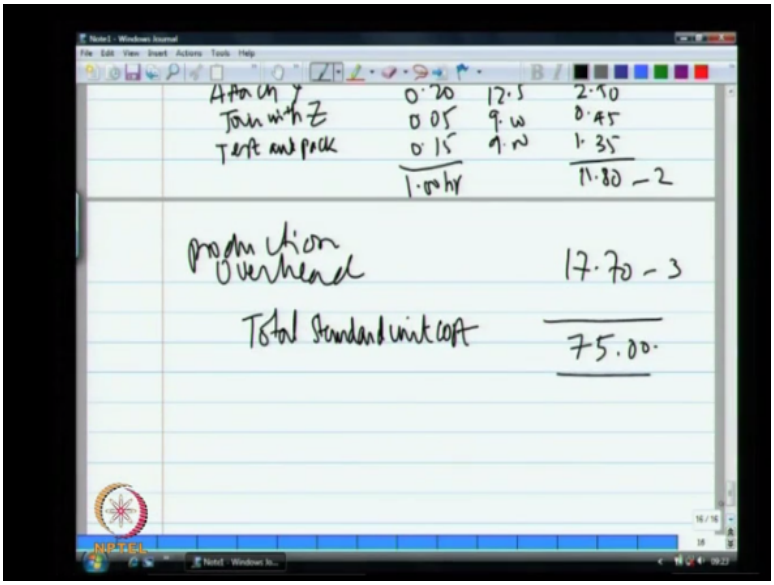

Then I said there is an overhead the in this case I am just talking about the production overhead which is let us say 17.7 there is basis for which I calculate this production overhead and this total is 1 hour. So, let us say the overhead is for every 1 hour that is being consume the direct low overhead is 17.7 rupees. So, the total standard unit cost is 1+2+3 which is 75. Now how did I calculate this total standard unit cost?

The standard quantity of each item if you go just this here, the standard quantity of each item of material input that is being use to produce this cost object to produce 1 unit of this cost object times the price of each unit of that material that is being consumed and the sum of all gives the material cost. Then similarly you calculate the standard cost of the direct labour input that is required to make 1 unit of the cost product.

So, the various labour operations that we saw here are listed and a standard time is determined for each of these labour operations which means I expect that to produce 1 unit of a particular cost product. I will spend 0.2 hours to attach Y, 0.6 hours to form material X. And these standard times are multiplied by the standard rates. So, that they converted to monetary terms and sum of these amounts of all the operations is the products standard labour cost.

So, you have the product standard material cost you have the product standard labour cost and by applying a predetermined overhead rate which is spect to the direct labour hours or labour dollars. Whatever the case may be you calculate the overhead that is included in the standard cost and in this case the total standard unit cost is 75 rupees. Suppose I manufacture 1000 units I told you that the difference between standard cost and budgeted cost is just the unit level.

And the aggregate level the standard unit cost here is 75 suppose I want to manufacture 100 units that the budgeted cost is 75 times 100 which is 7500. This is the difference budget cost and standard cost and for all practical purposes they are used interchangability. Because a unit level that gets expanded to an aggregate level made set the budgeted cost. So, now you understand that 3 critical elements get into the calculation of standard unit cost.

Those 3 are material, labour and overhead now why is this important it is because I told you management accounting by itself is more internal from a control perspective. I need to understand we saw we the budgeted cost. How much was the actual cost that was consume budget verses actual now to do that we need to make a comparison between the actual unit cost and the standard unit cost and if the actual is more than the standard.

Then there is an unfavourable variance if the actual is less than the standard there is a favourable variance. At a very broad level you need to understand that a favourable variance arises if the actual cost of the resources consumed for a cost product is less than what actually it was budgeted for and as I told you this standard cost represents what the cost should be. So, the standard direct material cost is the cost of producing 1 unit of the product, to produce 1 unit of the cost product.

How much of material that I am consuming at a given standard price of that material that is for a material cost. For labour cost how much of labour I am consuming to produce 1 unit of the cost product at a given specific labour price. So, I just like to make sure you that you understand this well.

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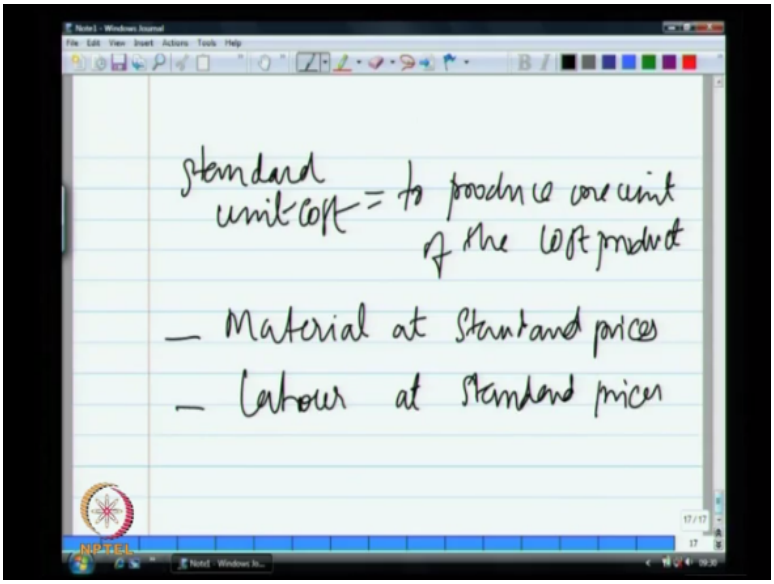

To produce 1 unit of the cost product how much material you are consuming at standard prices. How much labour at standard prices remember this is the cost sheet that we saw before from where do we think variance will arise let us go one by one, let us say I am talking about direct material cost.

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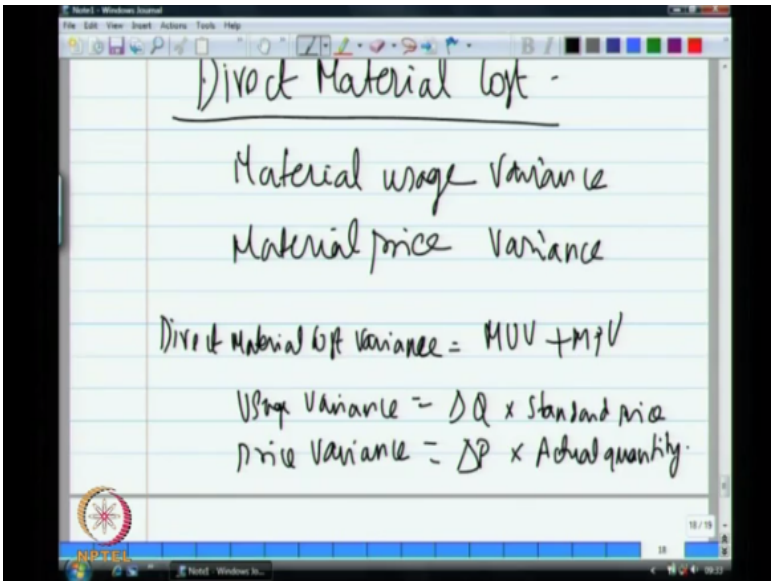

Now as per definition these standard cost is before we actually make the operations before we start doing something. We assume that to make 1 unit of this cost product we are going to consume some resources. And we are assuming that we can get these resources at this price so, if I am interested in knowing what the direct material variance is I should first we interested in knowing what can change from these standard cost that I have estimated.

What can change when I am actually engaged in making the cost product 2 things can change either the material that I am consuming or the price at which I am procuring the material. Material usage or material price and both these cases they may change either favourably or unfavourably I am a end up using more material or less material I am yet end up buying that material at higher price than I expected or at a price lower than I expected.

But as long as a there is a change then that this room for variance between standard and actual. So, we need to calculate what this material usage variance is what the material price variance is and the algebraic sum of these 2 is the direct material variance. So, direct material cost variance will be the algebraic sum of the material usage variance+material price variance. Now what is the usage variance, usage variance is I end up using a quantity which is different from what I thought I would be using times the standard price.

Price variance is a end up paying more or less there is a change in price for the actual quantity that I consume. Now let us I will just give you an example for you to understand this better let us say each unit of product x, x is the cost product that we are considering.

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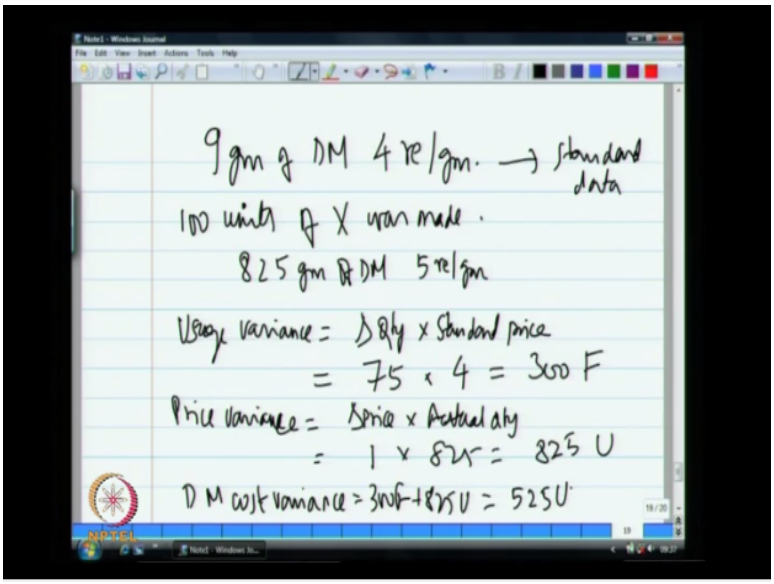

Now each unit of product X requires 9 grams of some direct material, 9 gram of that direct material which cost 4 rupees per gram. Now let us say within a given time period that I produced 100 units, 100 units of that material X was made. And in making that 100 units I consumed 825 grams of that direct material and it was purchased at the rate of rupees 5 per gram right, now I need to calculate what is the various, direct material cost various.

I can calculate it, because now this is standard data, standard data says to produce 1 unit of that X I need 9 grams of direct material the raw material and each gram is available at rupees 4. And I am producing 100 units which means I need to consume 900 units and then when I see here I just consume 825 units and I have to purchase each unit at 4 rupees per gram here I purchased at 5 rupees per gram.

So, you can clearly see that there is a change that is the variance both at the material consumption level and at the price level. So, which means there is usage variance as well as price variance and we need to calculate how much is the usage variance and how much is the price

variance. So, usage variance is as per our definition delta of the quantity into the standard price, in this case 75 times 4 which is 300.

Now this is 300 favourable or unfavourable, favourable because actually I should have consumed 900 units but I have consumed only 825 units. So, this delta quantity is favourable and hence 300 favourable is the usage variance. Now price variance, is delta price*actual quantity which is 1*the actual that we purchased was 825, favourable or unfavourable because it is unfavourable here because actually I should have purchased at 4 rupees per gram.

But today went when I did this I purchased at 5 rupees per gram. So, what is the direct material cost variance it is the algebraic sum of these two 300 favourable+825 unfavourable, 525 unfavourable. So, this is the direct material cost variance, now why are we doing this as a manager in the organisation I need to understand why there is this direct material cost variance.

So I look at this and I find that my people in the shop flow they have been able to reduce the quantity that was used when actually I should have 900 I have used 825 and positively contributed to the cost structure. Whereas my people in the purchasing when they have supposed to have purchase this at rupees 4. They have ended up purchasing this for rupees for 5 as a result of there is an unfavourable variance.

And that is why I am interested in doing this variance analysis to show to make sure there is it only those who are responsible for this variance or being asked for in the explanation. Otherwise in the absence of that you know that there is an unfavourable variance but you do not know whose responsible for this. But at the same time this is just a pointer and indicator for you to quickly go and diagnose the problem.

For example let us say somebody ended up in the name of providing a favourable variance you ended up favourable price variance let us take an example you end up buying material at prices lower than the actually it was budgeted for, but ended up buying poor quality raw material as a result of which more and more raw material was consumed exactly the opposite case I am

giving. Then looking at the variance you will assume that the purchasing department as done a good job the people at the production have done bad job.

Because they consumed more of the raw material when at the first place the reason that I consumed more of the raw material was because I was given poor quality raw material, because it was purchased at a price lesser than the standard price just because I had to submit a favourable price variance that is also possible. But a variance analysis is done to at least focus our effort to address issues where there is unfavourable variance.

And also to highlight those best practices that result in favourable variances. In the same example suppose I decide to give this as a small piece of a graphical aid.

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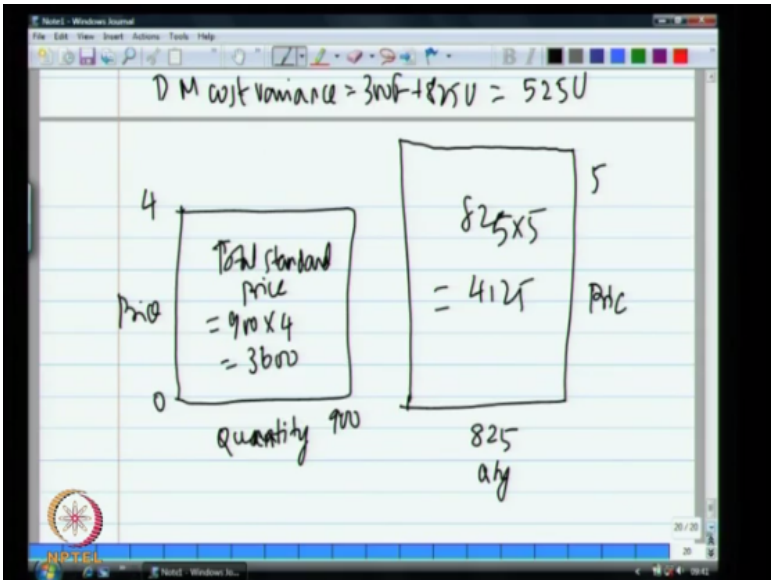

Let us say this is the quantity, this is the price, quantity is 0 to 900, price o to 4, so what is the let us say the area under this is the total standard price, standard price is 900*4 3600. And same thing actual 825 quantity price is 5 so, 825. So, I am just opposing both of these into 1 figure.

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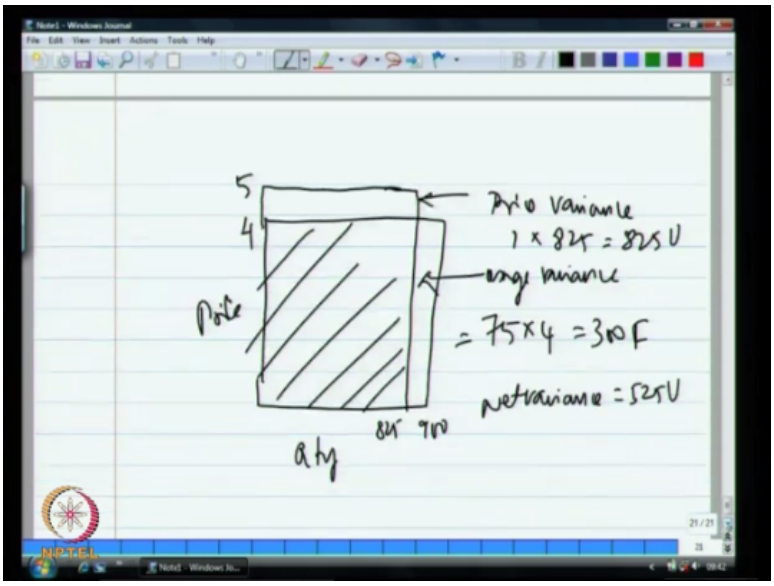

This is just another way of understanding quantity 825, 900 price 4, 5 now this will be the usage variance which is 75*4 300 favourable. This is the price variance which is 1 times 825, 825 unfavourable. So, net variance is 525 unfavourable so, now you understand that you can do a variance analysis to measure the difference between the actual and the budgeted. In this case we have just talked about the material cost variance.

And how do we do that we know that direct material variance can arise because of 2 consequences either there is a difference between this standard or the budgeted consumption of material. And the actual consumed or there is a difference in the price that was budgeted verses the actual price that it was purchased. At times these variance analysis will be helpful to identify management focus to certain set of operations which have either positively or negatively contributed to the direct material cost variance.

Now just as we had direct material cost variance a other important component to the direct cost of a cost product is the labour component. So, we know how to calculate direct material cost variance likewise you also have something called the direct labour cost variance. And in direct material there were 2 reasons why a variance arose 1 and the consumption of material and the second is the procurement of material the price which was procure.

Likewise labour variance also you might have 2 reasons for variance to arrive 1 you expected that this operation could be completed within this period of time. But when actually it was performed it either consumed more or less time as a result of which there is a variance. You expected that you paid you are labourers this wage but actually when the labourers were engaged. There was a change you paid the more or paid them less.

And what actually you thought form just as we had favourable and unfavourable variance in material. We can also favourable and unfavourable variance labour when actually you either consume less or more time then you budgeted for or you paid less or more then you budgeted for. So, just as you have a standard unit material cost you also have a standard unit labour cost which tells you that to produce 1 unit of the cost product.

You are going to consume certain amount of labour hours which is priced at a certain standard price. And remember when we saw the cause sheet before that total labour hours required to produce 1 unit of the product times the rated at which these labour hours was engaged is the total standard labour cost the unit labour unit standard labour cost. And if suppose we total make 1000 units times 1000 is the total budgeted labour cost.

Now how do we calculate labour variance we need to see the actual labour cost and the budgeted labour cost and see whether there is a difference to understand the variance just as we took an example to understand material variance. Next class I will be taking another example for you to understand labour variance. So, that you will get a proper understanding of both material variance, labour variance and the third thing is the overhead variance.

And all these 3 put together will be the total variance of a cost product against the budgeted and the actual the difference gives you the total variance. And that will be more useful in channelizing your resources either to improve procurement, price or labour efficiency or reduce over heads. So, next class we will be meet I will start with how to calculate labour variance Thank you.