Business Analysis for Engineers
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Lecture-20
Cash Conversion Cycle

This class will be spending some time to understand the importance of the cash conversion cycle, cash conversion cycle and how in that cycle the concept of planning inventory is very critical because inventory relates to cost and the purpose of this second part accounting is related to cost in management accounting, how there is one model that we use for proper inventory planning is necessary to optimise the cost elements.

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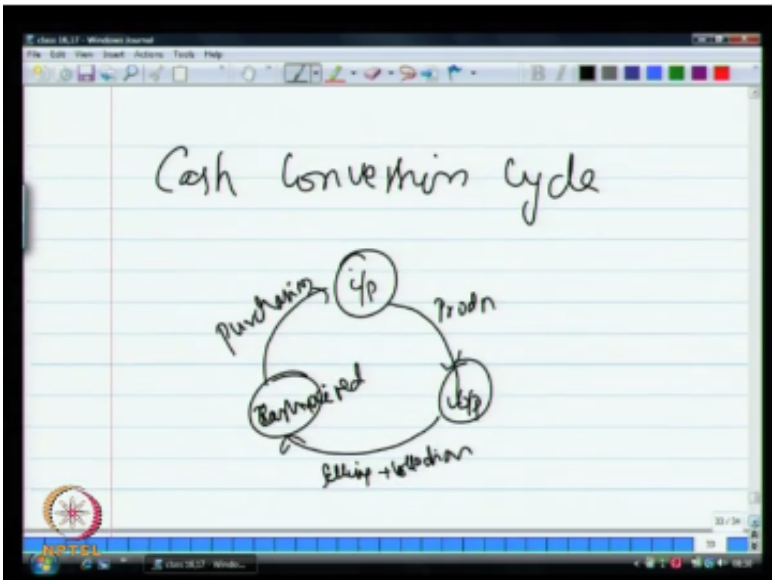

As a result of which you have a better cash control standard. Now to understand the cash conversion cycle its begin to understand a normal business cycle, any business entity whether it is engaged in selling goods or providing services will have 3 elements an input that gets converted into an output that gets sold for which cash is received and then again we buy inputs this process to be found.

The input output is your production, the output with cash station is your selling+collection and this will be our purchase, so if you look at it from this perspective you will understand that any organisation to execute a particular order, it needs to source raw materials and based on the payment policy it might pay immediately or pay after a period of time. But the first thing that we will do is source raw materials.

And then use labour and other form of resources and convert that raw material into saleable finished good and then that finish good gets sold and while conversion from raw material to finished good happens sometimes there again is a different period where I would pay for the labor consume immediately or different over a period of time remember when we talked about accrue wages which means that yes I engage labour and then I pay them later.

Inventory gets consumed the rate at which it gets consume depends on how quickly we are processing and once the finish good is available it is been sold. There again it is sold for cash which means I get fashion banner sale happen or I get my cash after a period of time more often than not what happens is the time it is taken to collect the cash out of a sale need not the earlier then the time that is required to pay my raw material vendors, or my labour wages which means even before I entity starts getting a cash inflow.

There is a prospect cash outflow will happen, now under the circumstances what we do is what we meaning that it will do it will get some short term financing and use that proceeds to pay the vendors or to pay the labourers or to the wages and when we receive cash out of the sales repay the short term finances and the financing charges and use or not use the surplus that we have in again sourcing raw materials.

And again the cycle keeps on repeating itself. So that the five critical elements I source raw material, I engage labour and convert finish good, I sell it, I have to pay my accounts payable, I have to collect my accounts received. These five important transactions are very critical when it comes to standing what a cash conversion cycle is all about. Now before macro environment understand this 3 terminology is already saw when we discuss fundamentals of accounting.

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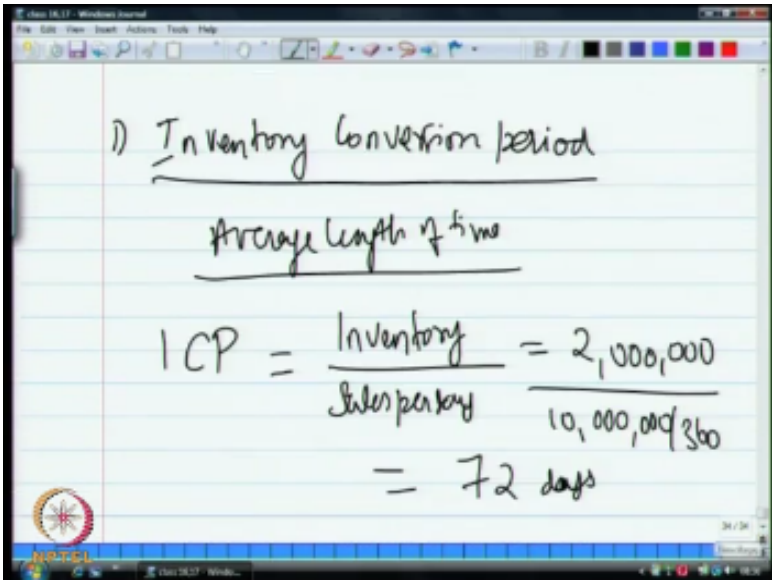

But never the less the cost of repetition let me again recapture those 3 terminologies. The first thing is the inventory conversion period. The inventory conversion period is the average length of time that required convert raw material into finished goods and then sell them as finish goods, that is my inventory conversion period. Now this is the technical definition, but then we need to know how to calculate this inventory conversion period.

Since this inventory conversion period then it means that it has to be expressed unit of time and we usually express this in case, so how do we calculate this average length of time that is required to convert raw materials to finish good and then sell them. So the inventory conversion period ICP a simply inventory/sales per day. Suppose I have the average inventory in a balance sheet that says the average inventories 2 million rupees.

And the annual sales is 10 million then the average inventory, inventory conversion period will be 2 million/10 million/360 which is 72 days. Now what is this 72 days implies, it means it takes for me and average today's convert raw material to finished goods this is what is inventory conversion period. The next that we need to understand is the receivable collection period.

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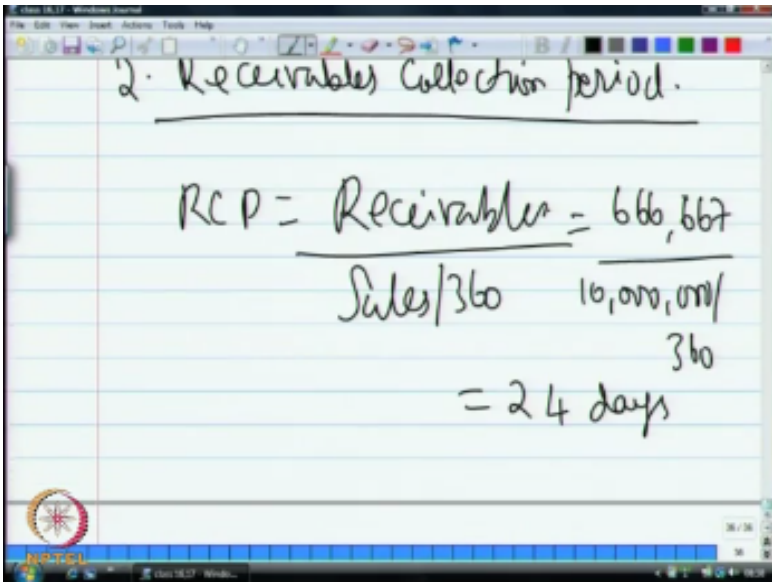

After inventory conversion period receivables collection period, here again it is a period and hence we would be expressing it in unit of time and again which is again the average length of time required to convert receivable that arose out of sales into cash or typically we call this also days sales outstanding which means calculate this receivables collection period express test days and tells you that for a particular sale that is being made it take so many days for the sale to be realised into cash.

How do we calculate this RCP is receivables/sales/360 are the sales per day, here again for the purpose of example let us say the receive is 666000 and all and the sales as we already said is 10 million the receivables collection period is 24 days which means it takes 24 days after sale convert receivables into cash. This is receivable collection period. Now the next important terminology that we need to understand is a payables deferral period.

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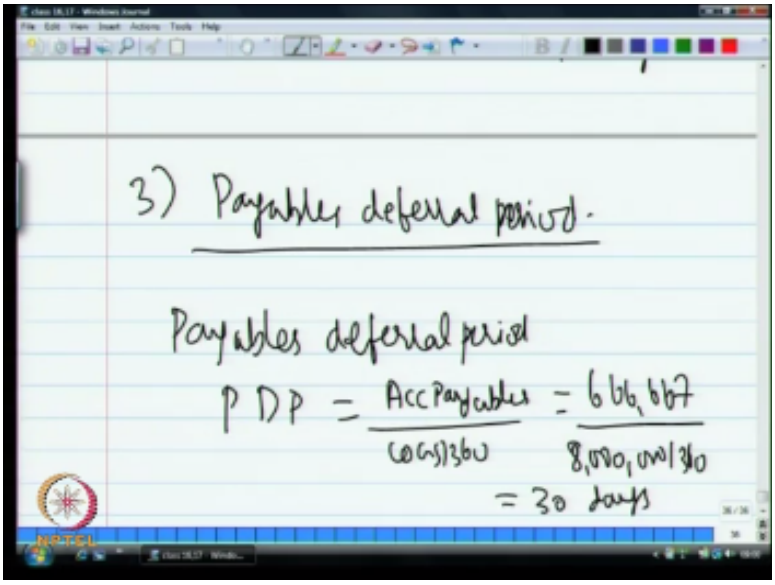

Again this note this is a period and hence we will be express in unit of time in this case is a base, is again the average length of time between the purchase of raw material and the time that we actually pay for the raw material. Now in the case of receivables collection period we know the outstanding accounts receivable and link with the sale was accounts receivable link sale. In the case of different period extending the same logic we are going to see the outstanding payable.

And link it with cost of good sold because payables is linked with cost of talking about raw materials, inventory and that we purchase been in case of all of these being cost of good sold. So if you are going to calculate the tables, deferral period PDP is the average accounts payable/cost of the sold/360, again let us say for the example the payable is also 666667 and the cost of good soul is 8000,000/360.

Then in this case the payable deferral period is 30 days which means it requires I am able to prolong for purchase for whom for whose, for whom the payment that I am making I will be able to prolong it for 30 days. So for every dollar that I purchases raw material I pay after 30 days. So these 3 things inventory conversion period the receivables period and the payments deferral period are important terminologies that you need to understand before we get into the concept of cash conversion cycle, so then what is cash conversion cycle.

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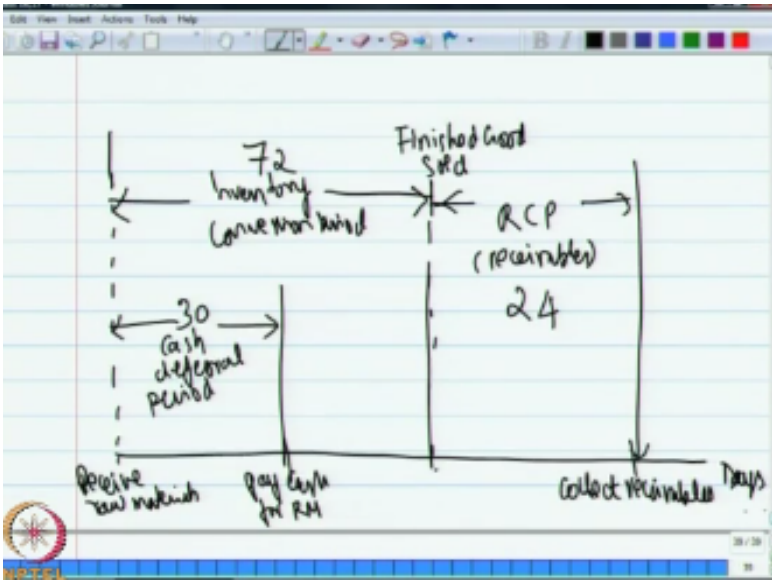

The cash conversion cycle next out these 3 periods, remember these 3 are all expressed in days, so the cash conversion cycle finds the net effect of these 3 periods, it means it fine that is required again it present days between the actual cash expenditure it was expenditure when it starts buying resources and the time is actually get cash receipts is made, so that period is the cash conversion cycle and inform these three terminologies it is east to understand that this will be equal to the inventory conversion period+receivables collection period-tables defer.

This gives your cash conversion site. Now let me just put this in illustration for you to understand better. Let this be base and I will indicate activities and the case it takes to complete a particular activity. Now we receive raw materials and then even before the sale is being made there are occasions where we have to pay for the raw materials, pay cash for long period and then a sale is being made.

And then finally we collect receivables, during this time I also finish good sold. Now let us see how I can capture this cash conversion cycle in this illustration. Between the time that I receive the raw material and the time that I pay for the raw material is my cash deferral period, and between the time that I receive my raw material and I sell finished good is my inventory conversion.

The time that I take to do this is my receivable collection period. Now in this example that we gave that we just saw before this is 30 days, the inventory conversion period was 72 days, the receivables collection period was 24 days and let us put this into the formula that we saw the

calculate the cash conversion cycle conversion. Si the cash conversion cycle will be my inventory conversion period which is 72 days+my receivable 24-the deferral period of 30 will be 66 days.

Now this 66 days can be explained looking at from various perspective, but for financing perspective it tells me that when I know that I will have to start or start delivering some service I will have to finance and outlay for a minimum 66 day period because for that 66 day period I do not have finance cash. So this is what is conversion cycle explain. Then the question is what would you do as a first step measurement.

Any prudent financial manager would say that I would like to reduce the financing requird and I can reduce that by reducing the cash conversion site as much as possible, to see whether I can reduce it from 6250 and how to do that I wither increase this or reduce this or reduce this which means I prolong the time that I take to pay my vendor, pay my labourers or increase my collection activities.

So that did the average collection period comes down from the existing. Form these two things what nothing to do with the production for sale, so nothing to do production for sale , so nothing to do what is happening inside the organisation. These two are something that is outside to the organisation, is what to do with how skillful I am negotiator of I am able to sell my vendor that I am going to take more number of days.

And this is 30 or if I am going to aggressively follow my customers and ensure that I get it number of days then this 24 and both these days understand this is something that is happening outside the process. So I am not saying I am not concerned about it was from prospective of looking at it from host management accounting, I am not going to look at these two elements.

But then let us see how is inventory conversion period is credit, how can I reduce the 72 from 72 to 65 is possible, then that is something that is got to do process that internal to inventory conversion period, how I am able to convert raw material into finish good and sell that, converting raw material to finished goods use of selling that sales activity. So let us given to that converting it from raw material to finished good.

How quickly can I do this, there are different ways of doing this, one I have best practices manufacturing practices that can be constantly improve as a result of which I am able to convert inventory to finish good at a faster rate. That is call technology or process efficiency fine, let for a moment let us for a moment assume that I am not going to get into that as well. One key element that I am looking is whether I am able to have source inventory just when I needed, process them and sell them.

So I source inventory just only need it which means I have the inventory only at a time when I need it and then convert it quickly because of the best manufacturing practices into finish good and that is why I am going to spend my remaining time of the class to see weather I have better inventory planning mechanism play. So that I just get inventory and actually required.

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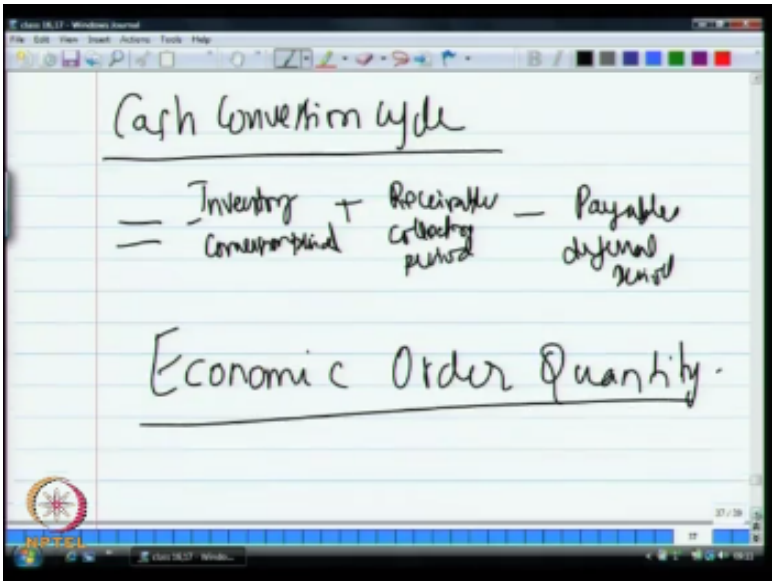

Now why is that that is important, planning inventory is very important because inventory process cost to an organisation which means that I should have some economics behind the inventory ordering mechanism to ensure that this cost that is involved in inventory is minimized. So I need to know then in that case is there something called an economic order quantity. Yes there is something called an economic order quantity about which we will be talking now.

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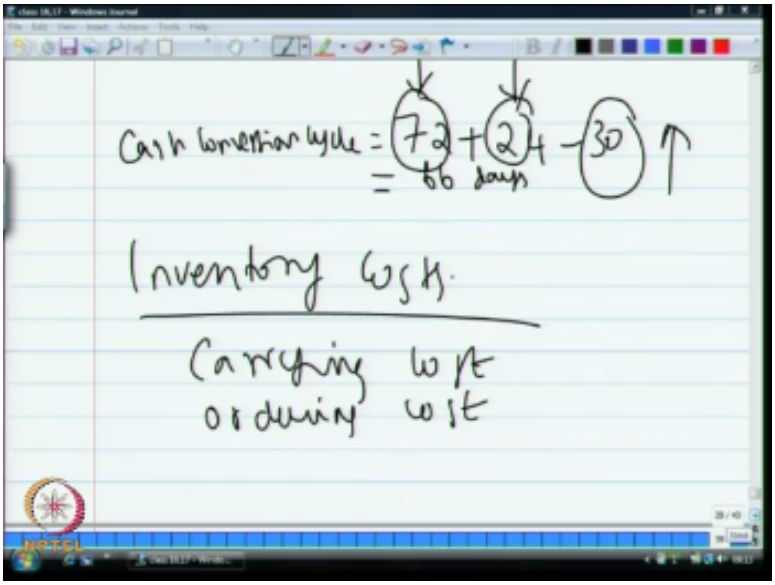

The reason that this is important is because as I told you before inventory is cost. Now what do you mean by inventories cost, what are the cost associated with inventory. Inventory cost, there are 2 broadcast carrying cost of an inventory, the other is the ordering cost of inventory. Let us begin with carrying cost. The carrying cost was generally rises in direct proportion to the average amount of inventory that actually hold or I carry, so carrying cost is directly proportional to average inventory carry.

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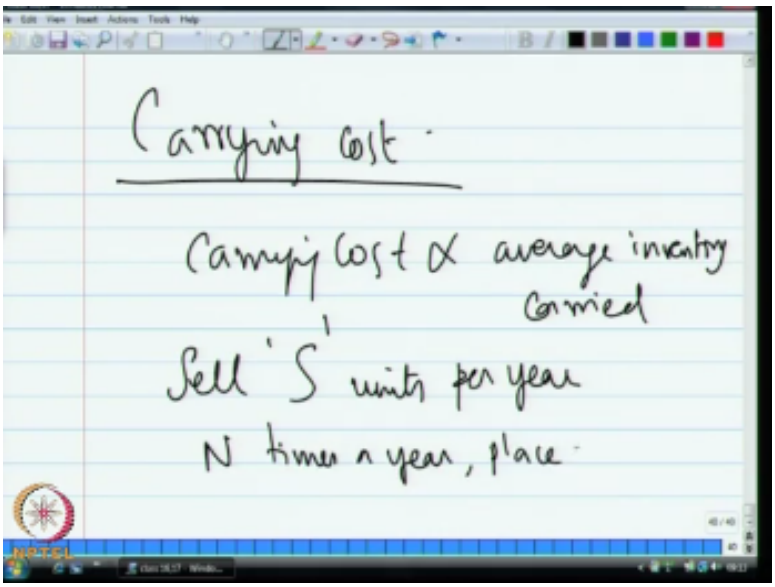

Now inventory carried again depends on the frequency which we order inventory. Now let us for example say I will just give you some illustration, if I sell yes units per year, and then a firm places equally sized orders throughout the year and let us say I do this n times a year, so n times a year I place equally size orders for inventory which means that assume that there is no safety stock then the average inventory A will be the number of units that I order per order.

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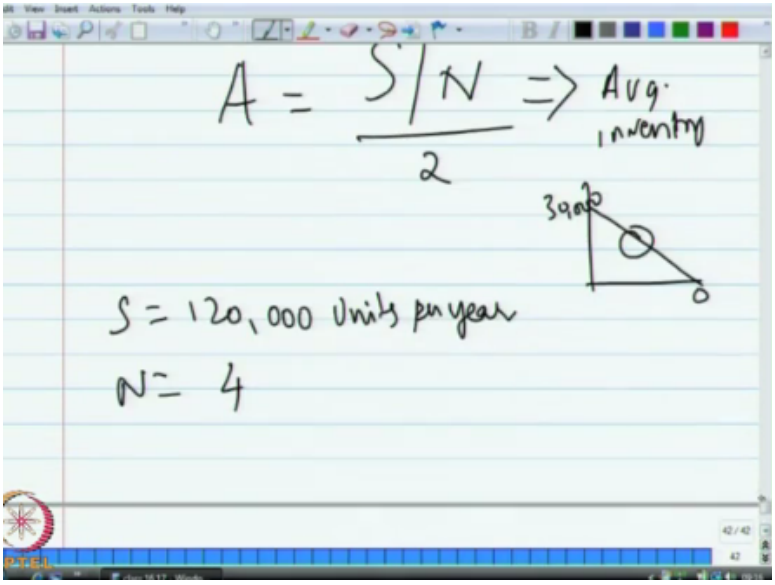

That is the equal size units that I order when I actually make evert order divided by 2, I will tell you why how we calculate the units per order which means the total sale units are divided by the number of times a order gives you the number of units and divided by 2 will give you the average inventory. Because if you look at the time scale, if this is let us we started with 30000 and drop down to 0, the next time you order this 30000 inventory that is available will increase to 30000.

But then hen the average inventory is 3000+0/2 which is 15000 and I have expressed as a formula. Now let us take for a example that if I sell 120000 units every year and that you seel this over 1 year let us say I I consume inventory in a uniform pattern consistently throughout the year and then I order inventory 4 times a year, which means since I consume inventory consistently throughout the year my inventory at the beginning of a quarter will be 30000.

Ending of the quarter will be 0 and then again quarter 30000 quarter because the number of times that I made this order is 4. So what is my average inventory in that case the average inventory will be 30000+0/15000 this is one way of calculating 120000/4/2 is 15000. So this is my average inventory. Now with this let us see what my carrying cost is going to be, since talking about carrying cost, how to calculate the carrying cost.

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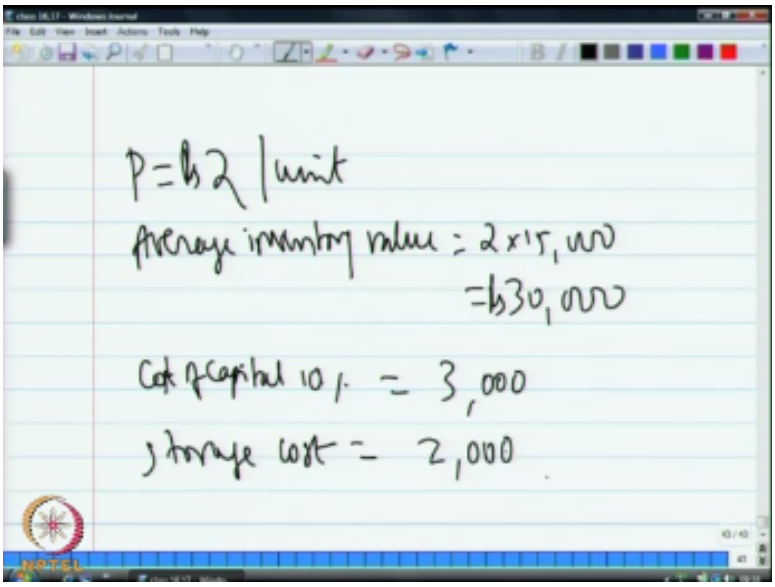

Now this 15000 average inventory is the number of units, now let us say that the cost at which I purchase this unit is 2 Rupees, so the purchasing price is 2 per unit, then the average inventory value will be 2 times 15000 which is 30000 rupees 30000, we need to appreciate the difference this 15000 is number of units and this 30000 is the value of the average inventory which is 2 times the average inventory.

Suppose I have a cost of capital which means there is 10u know for sources this inventory I **I** get loans which is finance at the rate of 10%. So the cost of capital is 10% and I incur 3000 rupees as financing charges 10% of this 30000. Assume this is this entire 30000 I am going to finance loan and then I incur cost of capital 10% at the rate of 10% is 30000, then storage cost let us say is another 2000.

Storage cost means pay security, insurance and all associated costs with that another 2000 and other miscellaneous storage cost or miscellaneous cost associated with this inventory is 500 it could be the cost of the security, the cost of labour engaged in, ensuring that the inventory store properly whatever maybe the reason that say that miscellaneous fix cost. Then I also marked down inventories at the rate of 1000 every quarter as depreciation.

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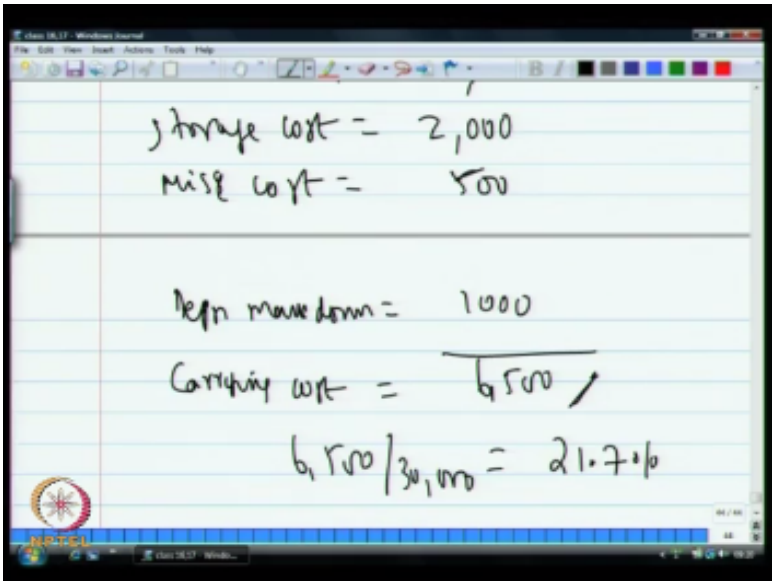

So depreciation marked down is 1000, which means the total carrying cost within this particular period is 6500. So the total cost of carrying this inventory whose value is 30000 is 6500 or let us express it as annual percentage cost will be 6500/30000 which is closely 21.7%. Si You an going to express it as a percentage let us assume that every such inventory carrying cost can be expressed as a percentage of the total inventory value.

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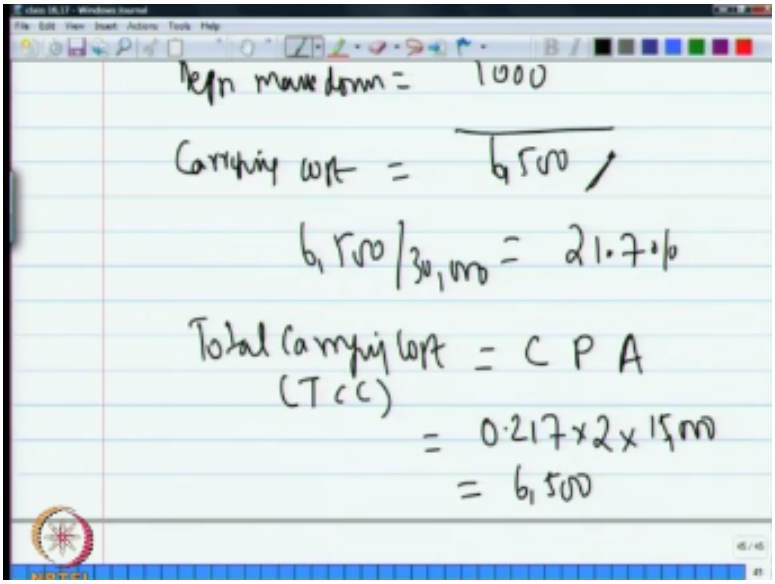

Then the total carrying cost TCC is the percentage carrying cost C in this case 21.7% and the price for unit this case 2 rupees per unit times the average number of units in this cases A. So if we just revert this back 0.217*2*15000, this is the average carrying cost, the total carrying cost of the invent, have this in one corner of your mind, this is the total carrying cost, but just as we have total carrying cost we will have something call ordering cost for inventory.

And just as carrying cost was directly proportional to the average inventory that I was holding the ordering cost will be directly proportional to the number of times that actually order and what is this basically it will be your office was the process cost paper where the calls that you make to make this order and make sure this is being delivered. So these are all your ordering cost.

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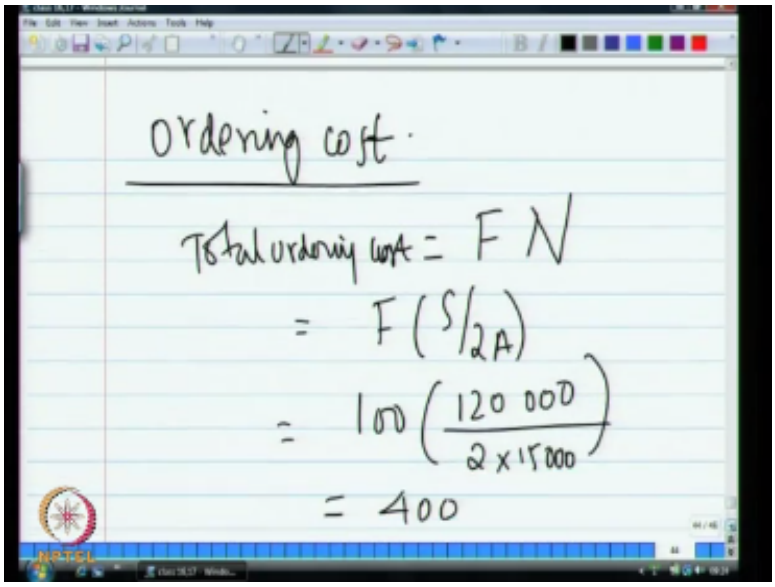

And let us say that the cost that is fixed to make this order is F, it is kind of a fixed cost, then my total ordering cost will be that fixed cost times the total number of times that order in a given particular year FN or if I am unable to break this F S/2A remember this filling a As as when hence I can express NS S/2A, yes go back to see this in order to understand A is S/N/2 as a result of which N can be expressed as S/2A.

Now again let me just give you a mathematical illustration to understand what will be the total ordering cost. If I say that a fixed cost for order is 100, and you know that I am selling 120000 units in a given year and that the average inventory size is 1500 then the ordering cost will be 12000/2*15000, it should be 400. Total ordering cost, so let us assume that I am not going to deal with stock out cost which is the cost of which I am all that I will enquire have inventory that are the inventory**.**

I am not interested in that and so I will restrict my calculations relation to the extent that the total inventory cost is equal to my total carrying cost+total ordering cost which in this case is my, so again the CPA can be express as Q/2. Now the average inventory is Q/2 or 1 half of

the size of the each order quantity is Q, the size of each order quantity in this case is 30000 or in the general case Q is the size of each order quantity.

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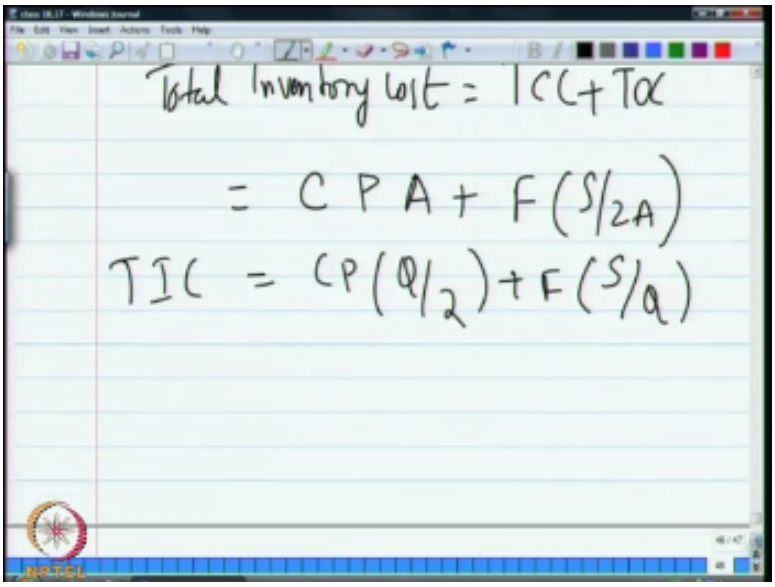

And so the average inventory is opening inventory+closing inventory divided/2 because here we are not having any stock which means closing inventory 0+F S/Q because Q is in the sanders expressing total inventory cost in terms of the size of the each order that I make intent for me to arrive at the total inventory cost as CP*Q/2+F*S/Q. Now we can see that this can be expressed that is the carrying cost associated with the average order size and the ordering costs associated with the average order size.

Now here we are trying to express with the order quantity, the reason that we are doing this because we need to understand how the inventory cost behave with changes in quantity, so more and more you keep bothering, so more and more time you keep ordering, more and more you will says in terms of the ordering cost. But the argument is more number of less quantity orders that you make will also drive your carrying cost.

Because the carrying cost is directly proportional to the inventory on that. So we need to strike a balance and understand how much of inventory we need to order each time and how many time we need to order in a given period and that is the balance that we are trying to achieve here. Now if I could express this graph for you to understand this better.

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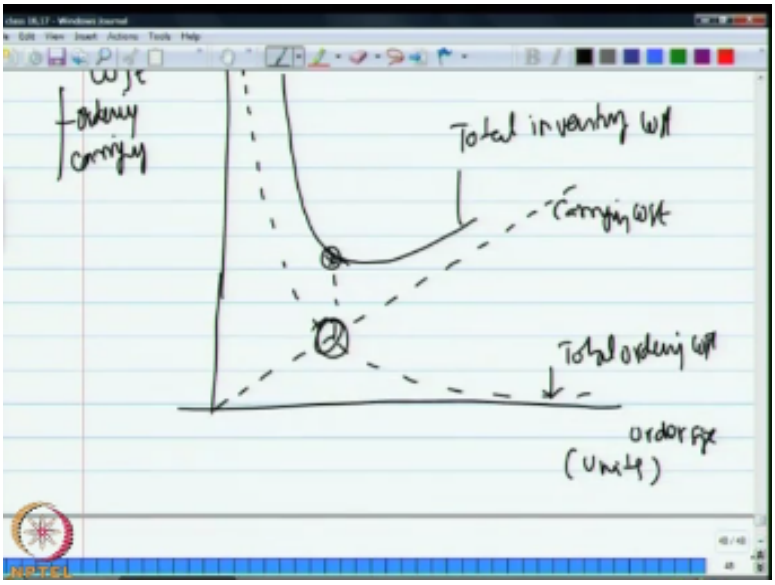

Let us say this is order size, order size expressed in number of units and let us say this is cost which is both ordering as well as carrying cost. I told you that the carrying cost is directly proportional to the average inventory. So let us say this is the carrying cost and that the ordering cost will come down with order sizes higher the order sizes then the ordering cost come down because the number of times you start making an order also keeps coming down if your order sizes huge.

So this will be your total ordering cost. So there will be point of intersection and the sum of these 2 carrying cost and total ordering cost will be your total inventory cost, that is my require and here in the graph you will find that this is the total inventory cost whose behaviour will be like this and whose cost will be minimum at this crossover, it is that minimum. Now it that minimum cost that we are interested to understand.

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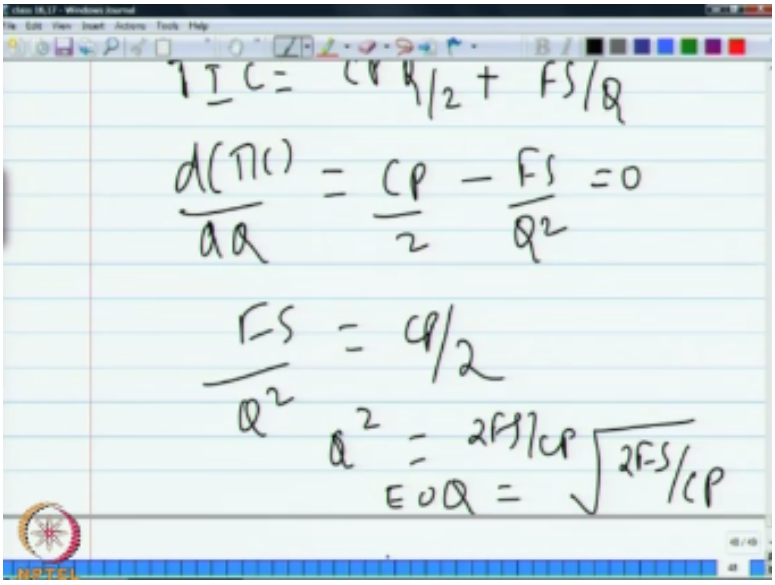

And is that the minimum cost we have some quantity which we call the economic order quantity which is simply the order quantity at which the total inventory costs is minimum. Now what is the total inventory cost, it is my CPQ/2+FS/Q. Now when will this CPQ/2+FS/Q the minimum when my differential of this with respect to Q which is CP/2-FS/Q square=0.

This is the principle of minimum using differentiation which means FS/Q square+CP/2 or Q square=2FS/CP or Q=root of 2FS/CP and this Q is my economic order quantity. So mathematically the economic order quantity is route of 2FS/CP and FSCP stands for what they are which means that at economic order quantity the total inventory costs is minimum and not only is the total inventory cost minimum.

And economic order quantity the carrying cost will be equal to your ordering cost. Now how we will use this relationship to study, how we set inventory targets, safety stock level and all this we will understand it at a greater length by picking up a small example to see how at the real purchasing level activity, what triggers in order when an ordering is place and why this economic order quantity is important.

Because it is this economic order quantity, the total inventory cost is minimum and an inventory cost is minimum means that the cost appeared incurring is minimum not only that, but also we are able to get inventory only when we want, so reducing unwanted cost and if we are able to get inventory just the time that we want and variable to process this and convert it into good sold.

Then link that with your inventory conversion period to see how much variable to contribute to reduce the invention period as a result of which my cash conversion cycle is also improve to that extent it for that particular purpose that I am explaining the concept of economic order quantity though there are various other models that are essential for management accounting. But I am going to restrict with only with this economic order quantity.

And when we meet next class I will take some illustrations to also bring into, bring inside another dimension of lead time and another dimension of safety stock level and how and when there is a particular safety stock level where will the trigger in terms of time when will the economic order quantity be triggered that we will understand in next class.