$$Equivalent\ uniform\ annual\ cost\ of\ initial\ cost = Initial\ cost \times \left[\frac{i(1+i)^n}{(1+i)^n - 1}\right]$$

$$= 2{,}89{,}00{,}000 \times \left[\frac{0.08(1+0.08)^{12.5}}{(1+0.08)^{12.5} - 1} = \text{₹}\ 37{,}41{,}844.41/year\right]$$

So this IC is named equivalent to A using uniform series capital recovery factor. The initial cost is converted into equivalent uniform annual cost, annualized cost we call it as annualized initial cost using uniform series capital recovery factor. So the initial cost is nothing but your 2,89,00,000 what you have determine just now after deducting the tire cost, 2,89,00,000 lakh multiplied by your uniform series capital recovery factor which is nothing but I into 1 + i whole power n by 1 + i whole power n - 1.

The interest rate you know it is nothing but 8 percent and n is 12.5 years. So you can get the annualized initial cost as 37,41,844.41 per year. So we have converted the initial cost into annualized initial cost using this uniform series capital recovery factor.

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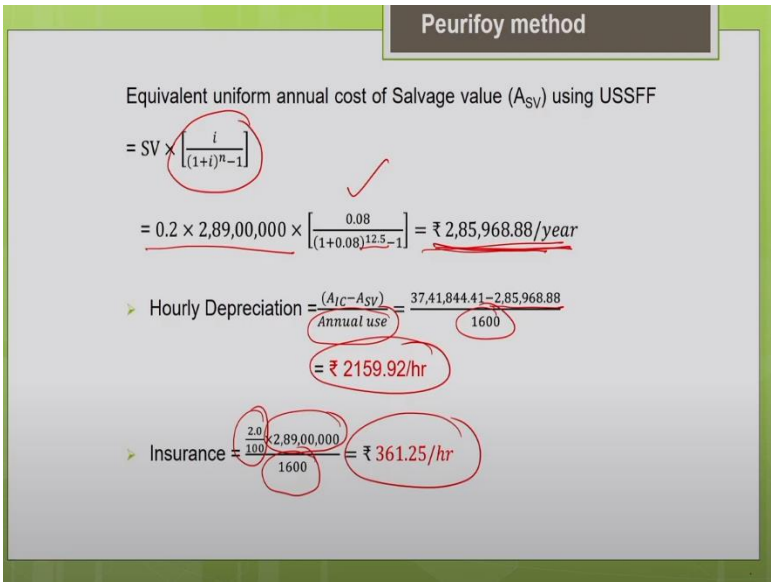

Now let us move on to the salvage value. So now I need to convert the future salvage value into equivalent uniform annual cost. So the salvage value will be converted into equivalent uniform annual cost.

$$Equivalent\ uniform\ annual\ cost\ of\ salvage\ value = Salvage\ value \times \left[\frac{i}{(1+i)^n - 1}\right]$$

$$= 0.2 \times 2{,}89{,}00{,}000 \times \left[\frac{0.08}{(1+0.08)^{12.5} - 1}\right] = ₹\ 2{,}85{,}968.88/year$$

How to convert it using uniform series sinking fund factor? So hope you remember this sinking fund factor is nothing but i divided by 1 + i to the power n minus 1 you multiply by this salvage value.

Salvage value is nothing but 20% of the initial cost minus the tire cost. So now you substitute the value the interest rate and the useful life of the machine n = 12.5 you will get the annualized salvage value as 2,85,968.88 per year. Now you can calculate the hourly depreciation. Hourly depreciation, depreciation is nothing but the difference between the initial cost minus the salvage value and you are going to divided by the annual use of the machine in hours.

So that I can get the hourly depreciation directly so your initial cost annualized initial cost is nothing but 37,41,844.41 minus your salvage value annualized salvage value is nothing but 2,85,968 divided by annual use of machine in hours is 1600.

$$\text{Hourly Depreciation } = \frac{(A_{IC} - A_{SV})}{Annual\ use} = \frac{37{,}41{,}844.41 - 2{,}85{,}968.88}{1600}$$

$$= ₹\ 2159.92/hr$$

So this will give me the hourly me the hourly depreciation as 2159.92 per hour. Now the other components of the ownership cost the insurance, taxes, storage everything we are going to calculate as a percentage of the initial cost minus the tire cost.

So, insurance percentage is 2% of the initial cost minus the tire cost divided by the 1600 hours that is the annual usage of machine in hours.

$$Insurance\ = \frac{\frac{2.0}{100} \times 2{,}89{,}00{,}000}{1600} = ₹\ 361.25/hr$$

That will give you the hourly insurance cost as rupees 361.25 per hour.

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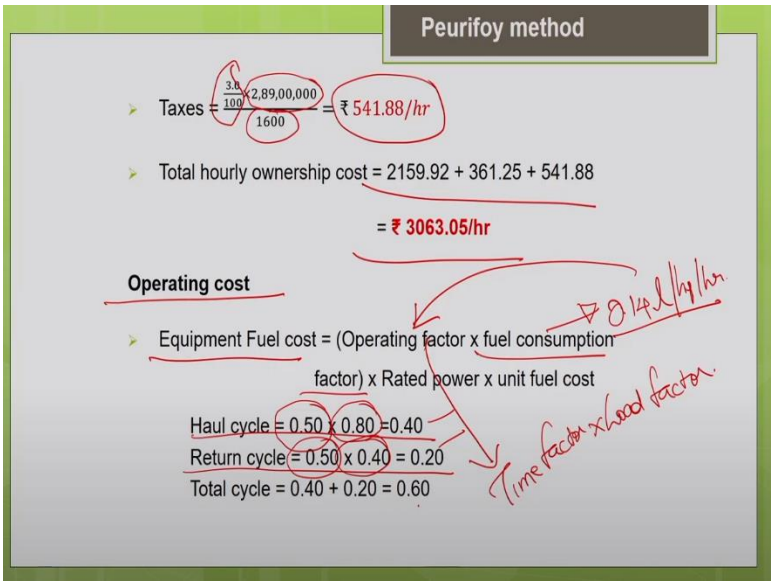

Now let me, calculate the taxes, tax percentage is 3% of the initial cost minus the tire cost divided by the hourly usage of the machine in a year.

$$Taxes = \frac{\frac{3.0}{100} \times 2,89,00,000}{1600} = ₹\,541.88/hr$$

So that will give me the hourly taxes rupees 541.88 per hour now add the total hourly ownership cost at all the components. So one is here that depreciation so you got the hourly depreciation as 2159.92 + insurance process rupees 361.25 + your taxes 541.88.

Total hourly ownership cost = 2159.92 + 361.25 + 541.88 = ***₹ 3063.05/hr***

So if you add everything you will get the total hourly ownership cost as rupees 3063.05 per hour. Now let us estimate the operating cost so first let us estimate the consumption of cost the fuel cost. So this fuel factor consumption power as I told you it is given for a standard condition for maximum output rated condition. So for this consumption hope you remember what is the fuel consumption factor? So it was 0.14 liter per horse power per hour.

So this fuel consumption factor I have to adjust according to the operating factor in my project condition. So operating factor is nothing but the product of time factor and the load factor. So now let us estimate for the haul cycle as well as the return cycle and the load factor because the power consumption is different for the haul cycle then load and empty the return cycle without the load the power consumption is different. As discussed in the question earlier.

So in the haul cycle it will contribute to 50% of the total production cycle and the return cycle it will contribute the 50% of the total production cycle time. And during the haul cycle the power consumption is 80% and during the return cycle when the truck is empty the power consumption is 40%. So multiply by the time multiply by the power consumption ratio you will get the load factor. So now add both 0.4 + 0.2 for the total production cycle you can get the load factor this is your load factor.

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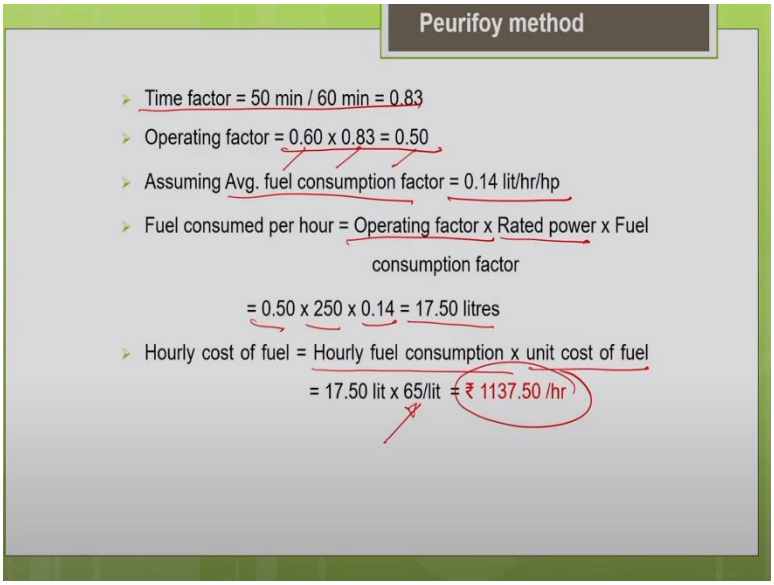

Now the time factor is directly given it is nothing but your working efficiency your machines working for 15 minutes per hour, 50 by 60 = 0.83 that is the working efficiency of your machine. Now the operating factor is nothing but time factor multiply by the load factor. Load factor is 0.6 time factor is 0.83 your operating factor is 0.5. Now you adjust your fuel consumption factor that is 0.14 liters per hour per horse power with the operating factor and the horse power of the engine.

Fuel consumed per hour = Operating factor x Rated power x Fuel consumption factor

= 0.50 x 250 x 0.14 = 17.50 litres

Hourly cost of fuel = Hourly fuel consumption x unit cost of fuel

= 17.50 lit x 65/lit = ₹ 1137.50 /hr

So we are going to adjust according to your machine and the according to the project working condition. So operating factor is nothing but 0.5 and the horsepower of the machine is 250 and the fuel consumption factor for the literature is 0.14. So the final fuel consumption per hour is 17.5

liters. Now we have to estimate the hourly cost of the fuel so for that you have to multiply the hourly fuel consumption by the unit cost of the fuel. Unit cost of the fuel in the local price 65 per liter. So when you multiply it you will get the hourly fuel cost 1137.50 per hour.

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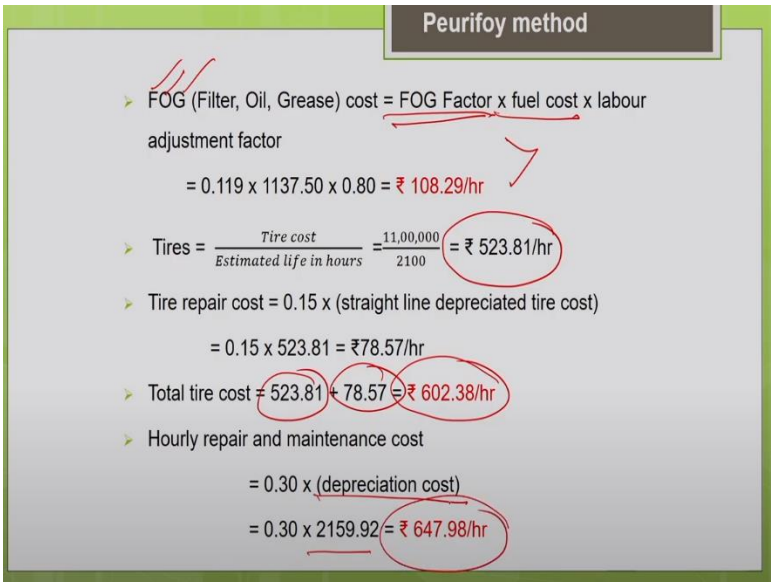

Now let us estimate the other consumable FOG filter, lubricating oil and grease. As I told you there are different ways to estimate it in some handbooks to get the FOG factor for different equipment for different operating conditions. This factor it can be express as the percentage of the fuel cost. So this FOG factor is derived for the particular equipment for the particular working condition. Say in this case for the dump truck say for the average conditions I have assumed the value as 0.119.

These are just approximate assumptions you can take it appropriate from the handbook. So then the fuel cost we have derived earlier hope you remember 1137.5 per hour. So you multiply the fuel cost then labor adjustment factor. So as I told you the labor skills will vary from place to place or region to region. So in some handbooks we can also get the information of the labor adjustment factor for the particular region.Then accordingly you can adjust your factor according to the labor available in the particular place.

FOG (Filter, Oil, Grease) cost = FOG Factor x fuel cost x labour adjustment factor

= 0.119 x 1137.50 x 0.80 = ₹ 108.29/hr

So you will get the FOG cost as rupees 108.29. So now you have estimate the consumable cost. Now let us move on to the estimation of the cost of tires. You know the tire cost is nothing but the 11 lakh and what is the estimate life of the tire for that particular project condition you can get it from the manufacturer or based upon your past accounting cost records you can get this information. This value is given directly in the question is 2100 hours. So

$$Tires = \frac{Tire\ cost}{Estimated\ life\ in\ hours} = \frac{11{,}00{,}000}{2100} = ₹\ 523.81/hr$$

gives you the hourly tire cost as rupees 523.81. Now calculate the tire repair cost as 15% of the straight line depreciated tire cost. So this is also given in the question. So if it is not given in the question you can assume the tire repair cost as 15% of the tire cost. 0.15 of the tire cost is 523.81.

$$Tire\ repair\ cost = 0.15\ x\ (straight\ line\ depreciated\ tire\ cost)$$
$$= 0.15\ x\ 523.81 = ₹78.57/hr$$

So that gives you 78.57 per hour. Now calculate the total tire cost. So total tire cost is

$$Total\ tire\ cost = 523.81 + 78.57 = ₹\ 602.38/\text{hr}.$$

So in this the repair and maintenance of the equipment excluding the tire is expressed as the percentage of the depreciation cost of the equipment. So the depreciation cost of the equipment is 2159.92.

Hope you remember your estimate of the depreciation cost is 2159.92. For that value we are going to use here to find the repair and maintenance cost 30% of the depreciation cost. So that will give you the value is 647.98 per hour.

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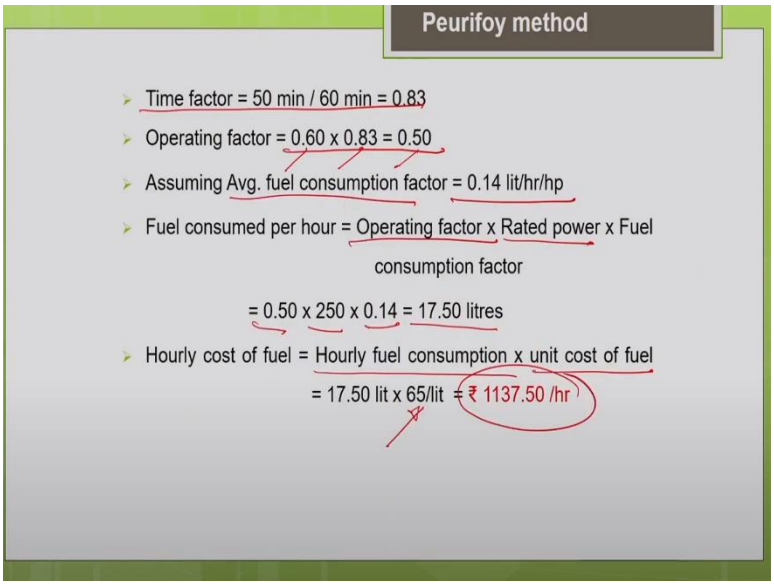

Now the total hourly operating cost you have to add the fuel cost, fuel consumption cost, your FOG cost, your tire cost and your repair and maintenance cost. So this is your repair and maintenance cost of the equipment. Already we have estimated the total hourly ownership cost you add both ownership along with the operator wages which is given as 200 rupees per hour in the particular place. So it varies from region to region.

Total hourly operating cost = 1137.50 + 108.29 + 602.38 + 647.98 = ***₹ 2496.15/hr***

Total hourly ownership cost = ***₹ 3063.05/hr***

Operator wages = ***₹ 200.00/hr***

So when you add all these three we can get the

Total cost of the equipment = 5759.2/hour

So using the Peurifoy approach particularly using the time value concept we have derived the value as 5759.2. So early in the caterpillar method I think the assumption were different and the value derived was 6122.29. So which method we are going to use for a particular company for the cost accounting purpose is totally it is a business policy.

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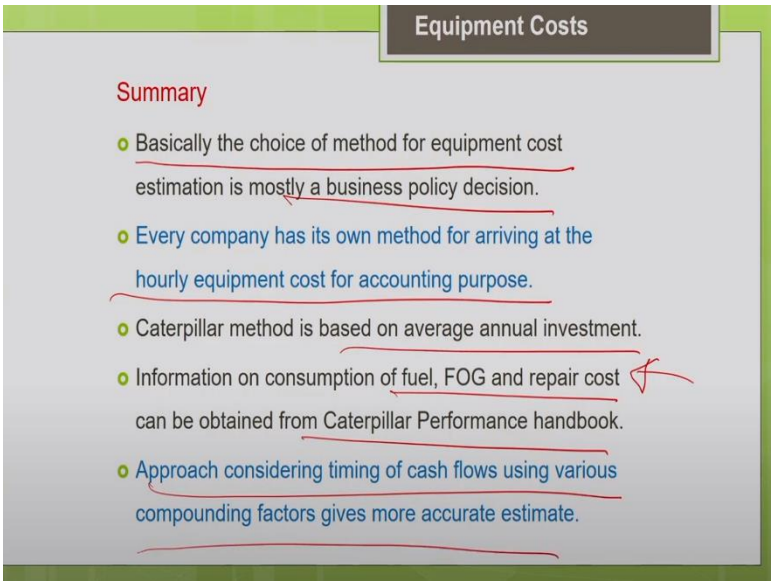

So it is totally left to the company. There is no constrain or any company owner or the project estimator that we have to follow only this particular method to estimate the equipment cost. There is no such constrain. It is totally left to the freedom of the particular company depends upon your company policy or the business policy. So basically the choice of the method of the equipment cost estimation business policy decision mostly.

Every company has its own method internal method for arriving at the hourly equipment cost for the accounting purpose. Then let us summarize what we learnt earlier in this lecture. The Caterpillar method we found it is based on average annual investment method which is approximate. And the information on the consumption of the fuel FOG repair cost everything is available for different equipment models and for different project conditions with a definition project working conditions from the caterpillar handbook.

Similarly, you can find this in many other handbooks which are available so lot of source of literature there to get this data. So most of the equipment supplier they provide the equipment handbook which have sufficient data of its parameters. And the; approach the time value method considering timing of cash flows using various compounding factors gives you the more accurate estimate. So with this we have come to the end of the lecture 5.

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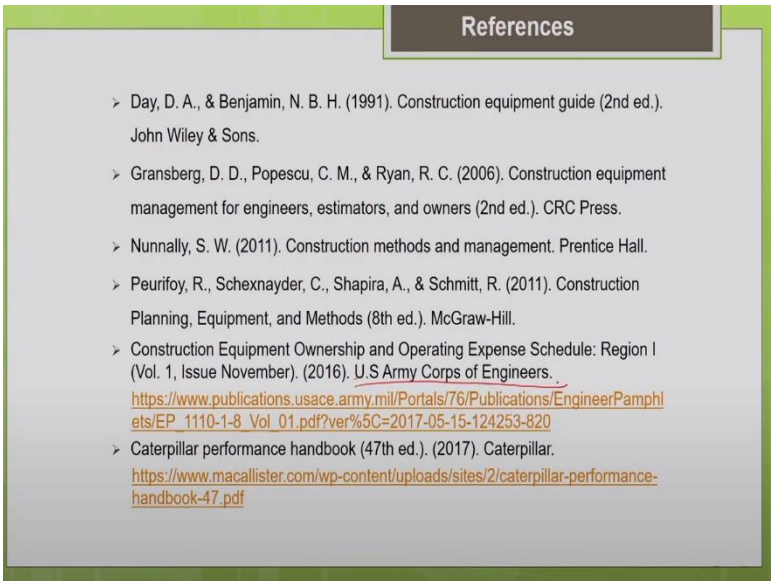

So these are the references which I have used for this lecture preparation. As I told you there are so many preparation handbooks. One such equipment handbook I have cited here is by US Army Corps of Engineers. You can try to go through all these handbooks so that you can get through on the information on the various factors which we have mention the fuel consumption factor or the FOG, labor adjustment factors.

And they have also given you the illustration of how to do the equipment cost estimation. So, I advise you to go through some of the equipment handbook to get more information on this related to this topic. Thank you.