Pricing Construction Equipment

Equipment Categories

1. Hand Tools: accounted for as an add-on at end of estimate
2. Equipment used for variety of work tasks (e.g. generators, compressors, tower cranes, pick-up trucks): accounted for as a General Expense under “Site Equipment”
3. Equipment used for specific tasks (e.g. excavation equipment, cranes): Priced against the work item on which it will be used.

Rent or Buy Equipment?

- Advantages of renting equipment:
  - Do not have to maintain a large pool of specialized equipment
  - Provides access to new and most efficient equipment
  - No storage requirements
  - Simplifies accounting of equipment cost
- Advantages of buying equipment:
  - Financial advantage
  - Indicates contractor's stability and qualification

Owning Cost of Equipment

- When comparing ownership against rental the following costs of ownership must be accounted for:
  1. Equipment Depreciation
  2. Maintenance & Repair
  3. Financing Expenses
  4. Insurance
  5. Storage
  6. Fuel & Lubricants cost

Depreciation

- Depreciation is related to the allocation of the cost of acquisition of an equipment over its life. (Different from market value depreciation, obsolescence, or physical depreciation)
- There are several depreciation methods. We will consider these three:
  - The straight-line method
  - The declining balance method
  - The production or use method

Straight-Line Depreciation

- Most common because of its ease
- Depreciation is uniform over the equipment life:
- Annual Depreciation =
  (Initial Cost – Estimated Salvage Value)/
  Estimated Life (years)
- Example:
  - Excavator price= SR 500,000; Useful Life = 5 years
  - Salvage Value = SR100,000
  - Annual Depreciation = (500,000 – 100,000) / 5
    = SR 80,000

Declining Balance Depreciation

- Recognizes that depreciation diminishes over time.
- Need to determine
  - Average annual rate of depreciation (AARD)
    1 / (Estimated Useful Life)
  - Book value (end of year n)
    Initial Cost – Accumulated Depreciation
    or
    Book value (end of year n-1) – Depreciation of year n
- Depreciation in Year n
  Book Value (end of year n-1) x AARD

Declining Balance (Example)

End of Year	Depreciation Rate	Depreciation	Book Value
0	0.0	-	500,000
1	0.2	100,000	400,000
2	0.2	80,000	320,000
3	0.2	64,000	256,000
4	0.2	51,200	204,800
5	0.2	104,800	100,000

Production or Use Depreciation

- Production depreciation depends on equipment usage.
- Procedure:
  - Estimate total production units over the useful life of equipment (P)
  - Determine depreciation per unit of production
    - (Initial cost – Salvage value) / Total production units
  - Determine depreciation in Year n
    - depreciation per unit x Year n production units

Production Depreciation Example

Price	SV	Production units	Depreciation per unit
500,000	100,000	10,000	40

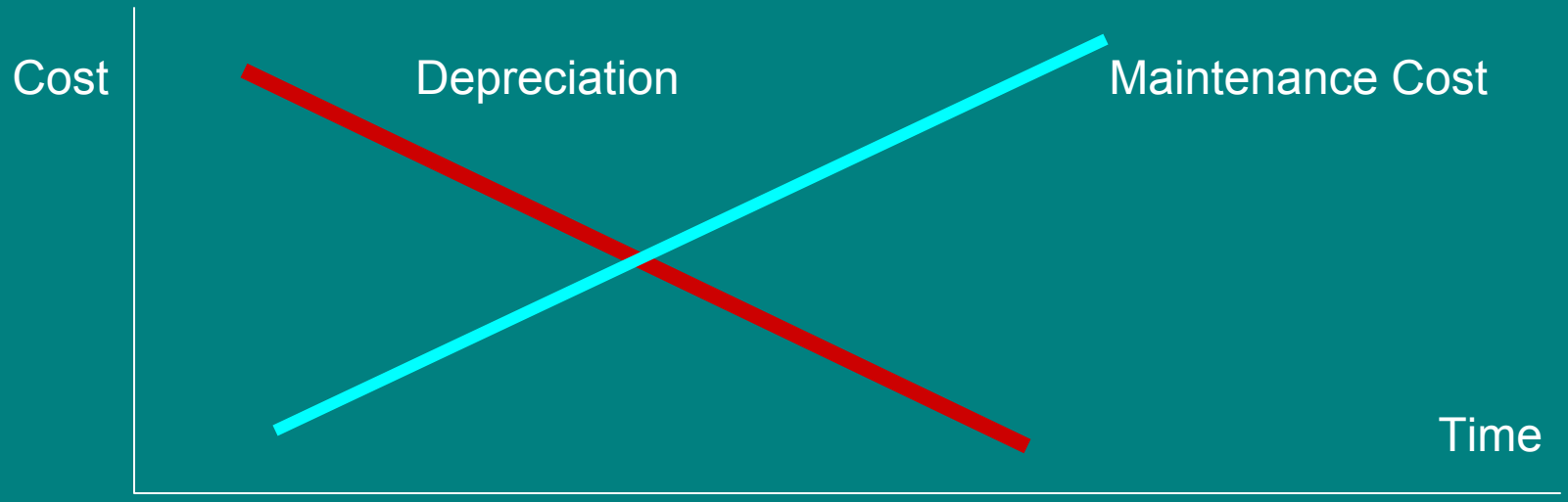
End of Year	Units Produced	Depreciation	Book Value
	M^3	SR	SR
0	0	-	500,000
1	2800	112,000	388,000
2	1600	64,000	324,000
3	2000	80,000	244,000
4	1500	60,000	184,000
5	2100	84,000	100,000

Rubber-Tired Equipment

- Tires are treated separately from the equipment because the life of the equipment is longer than the life of tires.
- Therefore, the price of tires is separated from the price of the equipment.
- Depreciation and Repair & Maintenance costs for the equipment is determined separately from the Depreciation and Repair & Maintenance costs for the tires.

Maintenance & Repair Costs

- May vary depending on equipment type and job conditions
- Cost allocation is based on a percentage of depreciation cost
- When straight-line method is used depreciation is constant and so maintenance charge will also be constant. More realistic is that depreciation decreases and maintenance increases. The assumption is that the increase in one is offset by the decrease in the other



Financing Expenses

- Estimated based on the Average Annual Investment in the equipment
- Average Annual Investment is equal to:
  - (Total Initial Cost + Salvage Value) / 2
  - Annual Financing Expenses = (Average Annual Investment) x (Interest rate)

Insurance & Storage Expenses

- If information about these expenses is available they should be used
- If expenses are not known they can be estimated as a percentage of the Average Annual Investment (similar to the financing costs)
- In the second case the percentage is added to the interest rate to estimate an *equipment overhead rate* for the financing and & insurance and storage expenses combined.

Fuel & Lubricants Expenses

- Best to use historical data from previous projects when available
- Otherwise it can be estimated based on: *engine type, engine size, operating factor, atmospheric pressure and temperature*.
- At 29.9 in of mercury pressure and 60º F fuel consumption:
  - Gasoline engine: 0.06 gal per hp-hour
  - Diesel engine: 0.04 gal per hp-hour

Fuel & Lubricants Expenses

- The operating factor is a percentage of the engine rated power. Equipment do not operate at full power constantly. The factor is the ratio of the average power used to the full power rating.
- Lubricants: Estimate cost as a percentage of fuel costs (text uses 10% in examples)

Equipment Operator Costs

- Operator expenses are also added to the equipment cost as follow:
  - Hourly wage: 80 SR/hour
  - Productivity: 50 m^3 per hour
  - Amount to be charged for operator cost: SR 80 / 50 m^3 = 16 SR/m^3

Company Overhead Costs

- Mark-up for Company overhead costs on the equipment are applied to the equipment rate if the purpose is to quote a rental rate.
- If the equipment rate is to determine the cost of using the equipment on a project then the mark-up is not added to the equipment rate. In this case mark-up is added to the bid at the end of the estimate.

Summary

Equipment Cost Item	Method of Determination
Depreciation	Method (SL, DB, Production)
Maint. & Repairs	% of Depreciation
Financing Expenses	Average Annual Investment x interest rate
Insurance & Storage	% of Average Annual Investment
Fuel / Lubricants	Formula (0.06/0.04 gal per hp-hour)
Equipment Operator	Based on Operator wage

Example

Calculate ownership cost per hour for a crawler-type excavator powered by a 250-hp diesel engine based on the following data

Vehicle	Excavator 250-hp Diesel	
Operating Factor	50%	
Purchase Price	850,000	
Freight	10,000	
Salvage Value	350,000	
Life Expectancy	6	Years
Hours per Year	2000	
Maintenance & Repair	110%	
Tire Cost	NA (track vehicle)	
Tire Life	NA (track vehicle)	
Maintenance & Repair (Tires)	NA (track vehicle)	
Equipment Overhead	11%	Average Annual Investm
Fuel Cost	1.5	Per Gal

Average Annual Investment
(Price + SV) / 2 — 605,000

Fuel Consumption
250 hp x 50% x 0.04 gal/hp-hr — 5 Gal per hour

Annual Cost

Depreciation

Vehicle: (Price - SV) / Life	85,000
Maint & Repair: (110% of Dep)	93,500
Equipment OH: 11% of AAI	66,550
Vehicle Fixed Cost	245,050

Freight	10,000	
Salvage Value	350,000	
Life Expectancy	6	Years
Hours per Year	2000	
Maintenance & Repair	110%	
Tire Cost	NA (track vehicle)	
Tire Life	NA (track vehicle)	
Maintenance & Repair (Tires)	NA (track vehicle)	
Equipment Overhead (Finance, Ins, & Storage)	11%	Average Annual Investm
Fuel Cost	1.5	Per Gal

Average Annual Investment		
(Price + SV) / 2	605,000	
Fuel Consumption		
250 hp x 50% x 0.04 gal/hp-hr	5	Gal per hour

Annual Cost

Depreciation	
Vehicle: (Price - SV) Life	85,000
Maint & Repair: (110% of Dep)	93,500
Equipment OH: 11% of AAI	66,550
Vehicle Fixed Cost	245,050

Hourly Cost:

Vehicle Cost	122.53
Tire Depreciation	0
Maintenance & Repair on tires	0
Fuel: Consumtion x Price	7.50
Oil: 10% of Fuel	0.75
Cost per Hour	130.78

Vehicle	Dump truck 120 hp Gasoline	
Operating Factor	40%	
Purchase Price	370,000	
Freight	5,000	
Salvage Value	50,000	
Life Expectancy	5	Years
Hours per Year	1,800	
Maintenance & Repair	130%	
Tire Cost	20,000	
Tire Life	4,000	
Maintenance & Repair (Tires)	15%	of tire depreciation
Equipment Overhead	11%	Average Annual Investm
Fuel Cost	4	Per Gal

Average Annual Investment		
(Price + SV) / 2	212,500	(Price includes tires)
Fuel Consumption		
120 hp x 40% x 0.06 gal/hp-hr	2.88	Gal per hour

Annual Cost

Depreciation	
Vehicle: (Price - SV) Life	61,000
Maint & Repair: (% of Dep)	79,300
Equipment OH: 11% of AAI	23,375
Vehicle Fixed Cost	163,675

Hourly Cost:

Vehicle Cost	90.93
Tire Depreciation	5

Freight	5,000	
Salvage Value	50,000	
Life Expectancy	5	Years
Hours per Year	1,800	
Maintenance & Repair	130%	
Tire Cost	20,000	
Tire Life	4,000	
Maintenance & Repair (Tires)	15%	of tire depreciation
Equipment Overhead	11%	Average Annual Investm
Fuel Cost	4	Per Gal

Average Annual Investment		
(Price + SV) / 2	202,500	
Fuel Consumption		
120 hp x 40% x 0.06 gal/hp-hr	2.88	Gal per hour

Annual Cost

Depreciation	
Vehicle: (Price - SV) Life	61,000
Maint & Repair: (% of Dep)	79,300
Equipment OH: 11% of AAI	22,275
Vehicle Fixed Cost	162,575

Hourly Cost:

Vehicle Cost	90.32
Tire Depreciation	5
Maintenance & Repair on tires	0.75
Fuel: Consumtion x Price	11.52
Oil: 10% of Fuel	1.152
Cost per Hour	108.74