

## UNIT 3

### INTRODUCTION TO COST ESTIMATION

#### Content 6: Calculation of depreciation cost

##### DEPRECIATION

The reduction in the value and efficiency of the plant, equipment or any fixed asset because of wear and tear, due to passage of time, use and climatic conditions is known as depreciation.

Depreciation is the process of allocating the acquisition cost of the tangible asset less salvage value, if any, in a systematic and a rational manner over the estimated life of an asset.

##### Causes of Depreciation

1. Depreciation due to physical conditions
  - a. Wear and tear
  - b. Physical decay
  - c. Accident
  - d. Poor maintenance and neglect
2. Depreciation due to functional conditions
  - a. Inadequacy
  - b. Obsolescence

##### Methods of Depreciation

1. Straight line method
2. Diminishing balance method
3. Sinking fund method
4. Annuity method
5. Sum of years digit's method
6. Insurance policy method
7. Machine hour method
8. Production- unit method
9. Revaluation method
10. Retirement method

### 1. Straight line method

In this method, the amount of depreciation is distributed over the useful life of the machine in equal periodic installments.

$$D = \frac{C-S}{n}$$

Where,

C= Initial cost of the machine in Rs. S= Salvage value or scrap value in Rs.  
n=Estimated life of the machine in Years  
D=Depreciation amount per year

**Problem 1:** A CNC machine was purchased for Rs.1, 25,000 on 15<sup>th</sup> June 1995, the erection and installation cost was Rs.10, 000. The CNC machine is to be replaced by a new one on 14<sup>th</sup> June 2010. If the estimated scrap value is Rs.25, 000, what should be the rate of depreciation and depreciation fund on June 14<sup>th</sup> 2002?

If after 9 years of running, some machine parts are to be replaced and the estimated replacement cost is Rs.4000, what will be the new rate of depreciation?

**Solution:**

Given: Machine cost= Rs.1, 25, 000; Erection and Installation cost= Rs.10, 000;

S=Rs.25, 000; n=from (15<sup>th</sup> June 1995 to 14<sup>th</sup> June 2010) is 15 Years

Total cost of machine, C =machine cost + Installation cost  
=1, 25, 000+10, 000  
=Rs.1, 35, 000

$$\begin{aligned} \text{(i) Rate of depreciation, } D &= \frac{C-S}{n} \\ &= \frac{1,35,000-25,000}{15} \\ &= \text{Rs.7, 333.33} \end{aligned}$$

(ii) Depreciation fund on 14<sup>th</sup> June 2002  
15<sup>th</sup> June 1995 to 14<sup>th</sup> June 2002 = 7 Years

$$= 7333.33 \times 7$$

$$= \text{Rs.} 51,333.33$$

(iii) New rate of depreciation after 9 Years (remaining 6 yrs=n)

Replacement cost=Rs.4,000

After 9<sup>th</sup> year the book value of the machine

$$= \text{Initial cost} - \text{Depreciation cost for 9 Years}$$

$$= 1,35,000 - (7,333.33 \times 9)$$

$$= \text{Rs.} 69,000.03$$

$$\text{New book value, } C' = \text{Rs.} 69,000.03 + \text{Rs.} 4000$$

$$= \text{Rs.} 73,000.03$$

The scrap value is Rs.25,000 is same, and therefore the depreciation rate for the remaining 6 years is given by

$$D' = \frac{C' - S}{n}$$

$$= \frac{73,000.03 - 25,000}{6}$$

$$= \text{Rs.} 8,000$$

## 2. Diminishing Balance method (% of Book value method)

In this method the equipment depreciates rapidly in the early years and later on slowly (i.e. depreciation fund is more during early years). Therefore repairs and renewals are not costly. The book value of machine goes on decreasing, so a certain percentage of current book value is taken as depreciation.

$$\text{Depreciation factor, } p = 1 - \left(\frac{S}{C}\right)^{\frac{1}{n}}$$

Where,

C= Initial cost of the machine in Rs.

S= Salvage value or scrap value in Rs.

n= Estimated life of the machine in Years

P= Fixed percentage for calculating yearly depreciation

If the rate of interest on the yearly sum insured® is given, then the depreciation fund at the end of n<sup>th</sup> year is given by |

$$\frac{C \cdot p}{(p+r)} [(1+r)^n - (1-p)^n] = C - S$$

**Note:** direct formula depreciation fund after n<sup>th</sup> year =  $C \times [1 - (1-p)^n]$

**Problem 2:** A certain machine was purchased for Rs.25, 000 and it was presumed it will last for 20 years. It was also considered that by selling the scrap of the machine, the residual value will be Rs. 4,000. If the depreciation is charged by reducing balance method, find out the depreciation amount for the 3<sup>rd</sup> year.

Also find out the percentage by which value of the machine is reduced every year.

Given:

$$C = \text{Rs.} 25,000; n = 20 \text{ years}; S = 4,000$$

To find:

- (i) Percentage by which value of machine is reduced every year (p)
- (ii) Depreciation amount for 3<sup>rd</sup> year
- (iii) Depreciation fund after 3<sup>rd</sup> year

Solution:

- (i) Percentage by which value of machine is reduced every year (p)

$$\begin{aligned} \text{Depreciation factor, } p &= 1 - \left(\frac{S}{C}\right)^{\frac{1}{n}} \\ &= 1 - \left(\frac{4000}{25000}\right)^{\frac{1}{20}} \\ p &= 0.08755 \end{aligned}$$

- (ii) Depreciation amount for 3<sup>rd</sup> year

$$\begin{aligned} \text{Value of machine after 1 year} &= C(1 - p) \\ &= 25000(1 - 0.08755) \\ &= \text{Rs. } 22811.09 \end{aligned}$$

$$\begin{aligned} \text{Therefore, Depreciation fund for first year} &= 25000 - 22811.09 \\ &= \text{Rs. } 2188.91 \end{aligned}$$

Similarly,

$$\begin{aligned} \text{Value of machine after 2 years} &= 22811.09(1 - 0.08755) \\ &= \text{Rs. } 20813.98 \end{aligned}$$

$$\begin{aligned} \text{Depreciation fund for 2<sup>nd</sup> year} &= 22811.09 - 20813.98 \\ &= \text{Rs. } 1997.11 \end{aligned}$$

$$\begin{aligned} \text{Value of machine after 3 years} &= 20813(1 - 0.08755) \\ &= \text{Rs. } 18990.82 \end{aligned}$$

$$\begin{aligned} \text{Depreciation fund for 3<sup>rd</sup> year} &= 20813.98 - 18990.82 \\ &= \text{Rs. } 1823.16 \end{aligned}$$

- (iii) Depreciation fund after 3<sup>rd</sup> year = Sum of depreciation funds for first 3 years
- $$\begin{aligned} &= 2188.91 + 1997.11 + 1823.16 \\ &= \text{Rs. } 6009.18 \end{aligned}$$