Chapter 9

Depreciation

Ex. A universal testing machine (UTM) is purchased for SR 1.6 million. It is expected to be of use to the company for 5 years, after which it will be sold for SR 100,000. Determine the depreciation deduction and the resulting unrecovered investment (Book value) during each year of the asset's life.

i. Use straight-line depreciation.
ii. Use declining balance depreciation, with a rate that ensures the book value equals the salvage value.
iii. Use double declining balance depreciation.
iv. Use double declining balance, switching to straight-line depreciation.
v. Use sum-of-years'-digits depreciation.

Solution

Straight-Line (SLN) Depreciation

P = SR 1600,000; F = SR 100,000; n =5

$$d_t = \frac{P - F}{n} \qquad d_t = \frac{1,600,000 - 100,000}{5} = 300,000$$

$$B_t = P - td_t = 1,600,000 - 300,000t$$

EOY	d_t	B_t
0	-	1,600,000
1	300,000	1,300,000
2	300,000	1,000,000
3	300,000	700,000
4	300,000	400,000
5	300,000	100,000

Solution

Declining Balance (DB) Depreciation

$$d_t = pP(1-p)^{t-1} \qquad B_t = P(1-p)^t \qquad p = 1 - \left(\frac{F}{P}\right)^{\frac{1}{n}}$$

$$p = 1 - \left(\frac{100{,}000}{1{,}600{,}000}\right)^{\frac{1}{5}} = 0.42565 \qquad d_t = 0.42565 \times 1{,}600{,}000(1-0.42565)^{t-1}$$

$$d_t = 681040 \times 0.57435^{t-1} \qquad B_t = 1{,}600{,}000 \times 0.57435^t$$

EOY	d_t	B_t
0	-	1,600,000
1	681,040	918,960
2	391,155.32	527,804.68
3	224,660	303,144.68
4	129,033.51	174,111.17
5	74,110.39	100,000

Solution

Double Declining Balance (DDB) Depreciation

$$d_t = pP(1-p)^{t-1} \qquad B_t = P(1-p)^t \qquad p = \frac{2}{n} = \frac{2}{5} = 0.4$$

$$d_t = 0.4 \times 1,600,000(1-0.4)^{t-1}$$

$$d_t = 640,000 \times 0.6^{t-1} \qquad B_t = 1,600,000 \times 0.6^t$$

EOY	d_t	B_t
0	-	1,600,000
1	640,000	960,000
2	384,000	576,000
3	230,400	345,600
4	138,240	207,360
5	82,944	124,416

Solution

DDB switching to SLN Depreciation

Switching from DDB to SLN as soon as

$$\frac{B_{t-1} - F}{n - (t - 1)} > pB_{t-1}$$

$$\frac{B_{t-1} - 100,000}{5 - (t - 1)} > 0.4B_{t-1}$$

EOY	DDB d_t $0.4B_{t-1}$		SLN d_t $\frac{B_{t-1} - 100,000}{5 - (t-1)}$	B_t
0	-		-	1,600,000
1	640,000	>	300,000	960,000
2	384,000	>	215,000	576,000
3	230,400	>	158,666.67	345,600
4	138,240	>	122,800	207,360
5	82,944	<	107,360	100,000

Solution

Sum of Years' Digits (SYD) Depreciation

$$d_t = \frac{n-(t-1)}{n(n+1)/2}(P - F) \qquad B_t = F + \frac{(n-t)(n-t+1)}{[n(n+1)]}(P - F)$$

$$d_t = \frac{5-(t-1)}{15}(1,500,000) \qquad B_t = 100,000 + \frac{(5-t)(5-t+1)}{30}(1,500,000)$$

EOY	d_t	B_t
0	-	1,600,000
1	500,000	1,100,000
2	400,000	700,000
3	300,000	400,000
4	200,000	200,000
5	100,000	100,000