

**ISE 307, Term 153**  
**ENGINEERING ECONOMIC ANALYSIS**

**Quiz# 4**

Date: Wednesday, August 24, 2016

**Q1.** A manufacturing company has purchased three assets:

Item	Asset Type		
	Lathe	Truck	Building
Initial cost	\$45,000	\$25,000	\$800,000
Book life	12 years	200,000 miles	50 years
MACRS class	7 years	5 years	39 years
Salvage value	\$3,000	\$2,000	\$100,000
Book depreciation	DDB	Unit production (UP)	SL

The truck was depreciated by the units-of-production method. Usage of the truck was 22,000 miles and 25,000 miles during the first two years, respectively.

- Calculate the book depreciation for each asset for the first two years.
- If the lathe is to be depreciated over the early portion of its life by the DDB method and then by a switch to the SL method for the remainder of its life, when should the switch occur?

(a) Book depreciation:

- Truck

$$D_1 = \frac{22,000}{200,000} (\$25,000 - \$2,000) = \$2,530$$

$$D_2 = \frac{25,000}{200,000} (\$25,000 - \$2,000) = \$2,875$$

- Lathe and building:

Lathe DDB			Building SL		
$n$	$D_n$	$B_n$	$n$	$D_n$	$B_n$
0		\$45,000	0		\$800,000
1	<b>\$7,500</b>	\$37,500	1	<b>\$14,000</b>	\$786,000
2	<b>\$6,250</b>	\$31,250	2	<b>\$14,000</b>	\$772,000

(b) Allowed annual depreciation:

With switching			
From DDB to SL			
$n$	$D_n$ (DDB)	$B_n$	$D_n$ (SL Method)
0		\$45,000	
1	\$7,500	\$37,500	$(45000-3000)/12=3500$
2	\$6,250	\$31,250	$(37500-3000)/11=3136$
3	\$5,208	\$26,042	$(31250-3000)/10=2825$
4	\$4,340	\$21,701	$(26042-3000)/9=2560$
5	\$3,617	\$18,084	$(21701-3000)/8=2338$
6	\$3,014	\$15,070	$(18084-3000)/7=2155$
7	\$2,512	\$12,559	$(15070-3000)/6=2012$
8	\$2,093	\$10,466	$(12559-3000)/5=1912$
9	\$1,744	\$8,599	$(10466-3000)/4=1867$
10	\$1,433	\$6,732	$(8599-3000)/3=1866$
11	\$1,122	\$4,866	$(6732-3000)/2=1866$
12	\$811	\$3,000	

The switching occurs at the 9th year.

**Q2.** To automate one of its production processes, Milwaukee Corporation bought three flexible manufacturing cells at a price of \$400,000 each. When they were delivered, Milwaukee paid freight charges of \$30,000 and handling fees of \$15,000. Site preparation for these cells cost \$50,000. Six employees, each earning \$15 an hour, worked five 40-hour weeks to set up and test the manufacturing cells. Special wiring and other materials applicable to the new manufacturing cells cost \$2,000.

- a) Determine the cost basis (the amount to be capitalized) for these cells.
- b) Suppose that these cells were sold after 3 years for \$50,000 each and they were depreciated using the 5-year MACRS Table given below. Determine the book value and tax gains or losses assuming 35% tax rate.

20%	32%	19.20%	11.52%	11.52%	5.76%
1	2	3	4	5	6

- a) Cost basis for flexible manufacturing cells:

flexible manufacturing cells	\$1,200,000
(@\$400,000×3)	
freight charges	\$30,000
handling fee	\$15,000
site preparation costs	\$50,000
start up and testing costs	\$18,000
special wiring and material costs	\$2,000
cost basis	<u>\$1,315,000</u>

(Note: start-up and testing costs = \$15 x 40 x 6 x 5 = \$18,000)

- b) Book Value =  $1,315,000 * [ 1 - (0.20 + 0.32 + 0.192/2) ] = \$504,960$   
 Tax gains (losses) =  $0.35*(150,000 - 504,960) = -\$124,236$   
 Thus, there will be tax credit (gains) of \$124,236.