

# Understanding Financial Management: A Practical Guide

## Problems and Answers

### Chapter 6

### Working Capital Management

#### 6.3 Operating and Cash Conversion Cycles

1. The Federer Company has an average inventory processing period of 68 days, an average receivables collection period of 35 days, and an average accounts payable payment period of 28 days.
  - A. What is Federer's operating cycle and cash conversion cycle?
  - B. How many times per year does Federer turn over its inventory?
2. Hewitt Corp has a receivables turnover of 8 times, an inventory turnover of 6 times, and a payables turnover of 10 times. What is Hewitt's operating cycle and cash conversion cycle?

#### 6.4 Cash Management

3. Davenport Inc. estimates it will need \$60 million in cash next year. Davenport also estimates it can earn an annual return of 6% on these invested funds. The transactions cost of converting securities into cash is \$250 per transaction. Use the Baumol cash management model to determine the following:
  - A. What is the optimal deposit size for Davenport?
  - B. What will be the firm's average cash balance?
  - C. How many deposits per year will Davenport make?
  - D. What will be the annual opportunity cost of funds, transactions costs, and total costs?
4. The Williams' Sisters Company has uncertain cash flows with an estimated standard deviation of \$25,000 per day. Assume the cost of converting securities into cash is \$100 per transaction, the interest rate is 9% per year, and the lower control limit (LCL) is zero. The company uses the Miller-Orr cash management model.
  - A. What is the upper control limit (UCL)?
  - B. What is the firm's average cash balance?
5. Transactions for the Roddick Corp. are summarized in the table below. When Roddick makes a deposit, it takes 1 day for the funds to be made available at the bank. When Roddick writes a check, it takes 3 days for the check to clear and the funds to be removed from their account at the bank. Fill in the table below by indicating for each day the amount of Roddick's available balance at the bank, disbursement float, collection (availability) float, and net float.

Day	Checks written	Deposits	Book balance	Available balance	Disbursement float	Collection float	Total float
1	0	0	25,000	25,000			
2	1,000	2,000	26,000				
3	1,250	0	24,750				
4	2,250	0	22,500				
5	0	1,000	23,500				
6	2,500	5,000	26,000				
7	1,000	0	25,000				
8	0	0	25,000				
9	0	0	25,000				
10	0	0	25,000				

- The book balance for day  $t$  is equal to the book balance for day  $t-1$  minus the checks for day  $t$  plus the deposits for day  $t$ .
  - The available balance for day  $t$  is equal to the available balance for day  $t-1$  minus the checks written for day  $t-3$  plus the deposits for day  $t-1$ .
  - The disbursement float for day  $t$  is equal to the disbursement float from day  $t-1$  plus any checks written on day  $t$  minus any checks written on day  $t-3$ .
  - The collection (availability) float for day  $t$  is equal to the availability float from the day  $t-1$  minus any deposits made on day  $t$  plus any deposits made on day  $t-1$ .
  - The total float for day  $t$  is the disbursement float for day  $t$  plus the collection (availability) float for day  $t$ .
6. The Sharpe Fertilizer Company (SFC) currently has one collection center in St. Louis where it collects customer payments. SFC is considering a lockbox system with additional collection centers in Charlotte and Seattle. SFC estimates that the lockbox system will reduce the time to convert payments into available funds by an average of 2 days. SFC estimates the extra annual costs of the lockbox system to be \$10,000 per year. If SFC collects an average of \$150,000 per day and the opportunity cost of funds is 6% per year, what is the expected annual profit of the new lockbox system?

## 6.5 Accounts Receivable Management

7. On October 1, an analyst is preparing an aging schedule for the Henin Printing Company, which has the following invoices outstanding:

Invoice	Invoice Date	Amount
922	July 17	\$15,000
924	July 23	12,800
925	Aug 6	8,400
927	Aug 11	22,500
928	Aug 18	14,000
929	Aug 24	6,700
930	Aug 26	10,300
931	Sep 7	5,600
932	Sep 13	14,500
933	Sep 19	9,300
934	Sep 25	13,200
935	Sep 27	11,500
936	Sep 29	6,200

Prepare an aging schedule that combines receivables into three categories: 0-30 days, 31-60 days, and 61-90 days.

8. The aging schedule for Graf Appliances Company is shown below. If the receivables in each age category have an age equivalent to the midpoint of the range, what is the firm's average age of accounts receivable?

Age of account (days)	Receivable amount (\$)	Percentage of total value (%)
0-30 days	\$4,600,500	55.6%
30-60	2,725,800	32.9
60-90	950,500	11.5
Total	\$8,276,800	100.0%

## 6.6 Inventory Management

9. The Cooper Company uses 50,000 units of inventory each year. The carrying cost per unit average inventory is \$10 and the fixed cost per order is \$100.
- What is the economic order quantity?
  - What is the number of order per year?
  - What is the time interval between orders?
  - What is the average inventory level?
  - What are the annual total costs of the EOQ system?

## Answers

1A. The operating cycle and cash conversion cycle for Federer are:

$$\text{Operating cycle} = \left( \begin{array}{c} \text{Receivables} \\ \text{collection period} \end{array} \right) + \left( \begin{array}{c} \text{Inventory} \\ \text{processing period} \end{array} \right)$$

$$\text{Operating cycle} = 35 \text{ days} + 68 \text{ days} = 103 \text{ days}$$

$$\text{Cash conversion cycle} = \left( \begin{array}{c} \text{Receivables} \\ \text{collection period} \end{array} \right) + \left( \begin{array}{c} \text{Inventory} \\ \text{processing period} \end{array} \right) - \left( \begin{array}{c} \text{Accounts payable} \\ \text{payment period} \end{array} \right)$$

$$\text{Cash conversion cycle} = 35 \text{ days} + 68 \text{ days} - 28 \text{ days} = 75 \text{ days}$$

1B. The inventory turnover for Federer is:

$$\text{Inventory turnover} = \frac{365 \text{ days}}{\text{Inventory processing period}} = \frac{365}{68} = 5.37 \text{ times}$$

2. To compute the cash operating cycle and cash conversion cycle for Hewitt, convert the "payment period" into "turnover" ratios:

$$\text{Receivables collection period} = \frac{365 \text{ days}}{\text{Receivables turnover}} = \frac{365}{8} = 45.6 \text{ days}$$

$$\text{Inventory processing period} = \frac{365 \text{ days}}{\text{Inventory turnover}} = \frac{365}{6} = 60.8 \text{ days}$$

$$\text{Accounts payable payment period} = \frac{365 \text{ days}}{\text{Payables turnover}} = \frac{365}{10} = 36.5 \text{ days}$$

The cash operating cycle is:

$$\text{Cash operating cycle} = \left( \begin{array}{c} \text{Receivables} \\ \text{collection period} \end{array} \right) + \left( \begin{array}{c} \text{Inventory} \\ \text{processing period} \end{array} \right)$$

$$\text{Cash operating cycle} = 45.6 \text{ days} + 60.8 \text{ days} = 106.4 \text{ days}$$

The cash conversion cycle is:

$$\text{Cash conversion cycle} = \left( \frac{\text{Receivables}}{\text{collection period}} \right) + \left( \frac{\text{Inventory}}{\text{processing period}} \right) - \left( \frac{\text{Accounts payable}}{\text{payment period}} \right)$$

$$\text{Cash conversion cycle} = 45.6 \text{ days} + 60.8 \text{ days} - 36.5 \text{ days} = 69.9 \text{ days}$$

3A. The optimal deposit size ( $C^*$ ) is:

$$C^* = \sqrt{\frac{2bT}{i}} = \sqrt{\frac{2(\$250)(\$60,000,000)}{0.06}} = \$707,107$$

3B. The average cash balance is:

$$\text{Average cash balance} = C/2 = \$707,107/2 = \$353,553$$

3C. The number of deposits per year is:

$$\text{Number of deposits} = T/C = \$60,000,000/\$353,553 = 169.7 \text{ (round to 170)}$$

3D. The annual opportunity cost of funds, transactions costs, and total costs are:

$$\text{Opportunity costs} = i \left( \frac{C}{2} \right) = 0.06 \left( \frac{\$707,107}{2} \right) = \$21,213$$

$$\text{Transactions costs} = b \left( \frac{T}{C} \right) = \$250 \left( \frac{\$60,000,000}{\$707,107} \right) = \$21,213$$

$$\text{Total costs} = \text{Transactions costs} + \text{Opportunity costs} = \$42,426$$

4A. Before computing the return point and UCL, the value of Z must be computed:

$$Z = \left( \frac{3b\sigma^2}{4i} \right)^{1/3} = \left( \frac{3(\$100)(\$25,000)^2}{4(0.09/365)} \right)^{1/3} = \$57,436$$

$$\text{UCL} = \text{LCL} + 3Z = 0 + 3(\$57,436) = \$172,308$$

4B. The average cash balance is:

$$\text{Average cash balance} = \text{LCL} + (4/3)Z = 0 + (4/3)(\$57,436) = \$76,581$$

5. The amount of Roddick's available balance at the bank, disbursement float, collection (availability) float, and net float are shown below:

Day (t)	Checks written	Deposits	Book balance	Available balance	Disbursement float	Collection float	Total float
1	0	0	25,000	25,000	0	0	0
2	1,000	2,000	26,000	25,000	1,000	(2,000)	(1,000)
3	1,250	0	24,750	27,000	2,250	0	2,250
4	2,250	0	22,500	27,000	4,500	0	4,500
5	0	1,000	23,500	26,000	3,500	(1,000)	2,500
6	2,500	5,000	26,000	25,750	4,750	(5,000)	(250)
7	1,000	0	25,000	28,500	3,500	0	3,500
8	0	0	25,000	28,500	3,500	0	3,500
9	0	0	25,000	26,000	1,000	0	1,000
10	0	0	25,000	25,000	0	0	0

6. The annual profit by switching to a lockbox system is:

Reduction in float = (\$150,000 per day)(2 days) = \$300,000

Value of float reduction = (\$300,000)(0.06)	\$18,000
Less: annual operating cost of the lockbox system	<u>10,000</u>
Expected annual profit of the lockbox system	<u>\$ 8,000</u>

7. The aging schedule is:

Age of account (days)	Receivable amount (\$)	Percent of total value (%)
0 – 30 days	\$ 60,300	40.2%
30 – 60	61,900	41.3
60 – 90	27,800	18.5
Total	\$150,000	100.0%

8. The average age of accounts receivable is:

Average age of account [1]	Percent of total value [2]	Weighted average [1] x [2]
15 days	0.556	8.34
45	0.329	14.81
75	0.115	8.63
Average age of accounts receivable = 31.78 days		

- 9A. The economic order quantity is:

$$EOQ = \sqrt{\frac{2FS}{C}} = \sqrt{\frac{2(100)(50,000)}{10}} = 1,000 \text{ units}$$

- 9B. The number of orders per year:

$$\text{Number of orders per year} = \frac{S}{EOQ} = \frac{50,000}{1,000} = 50 \text{ orders}$$

9C. The time interval between orders is:

$$\text{Time interval between orders} = \frac{\text{EOQ}}{S} = \frac{1,000}{50,000} = 0.02 \text{ years} = 0.02(365 \text{ days}) = 7.3 \text{ days}$$

9D. The average inventory level is:

$$\text{Average inventory level} = \frac{\text{EOQ}}{2} = \frac{1,000}{2} = 500 \text{ units}$$

9E. The annual total costs of the EOQ system are:

$$\text{Total costs} = \text{Ordering costs} + \text{Carrying costs} = F\left(\frac{S}{Q}\right) + C\left(\frac{Q}{2}\right)$$

$$\text{Total costs} = \$100\left(\frac{50,000}{1,000}\right) + \$10\left(\frac{1,000}{2}\right) = \$5,000 + \$5,000 = \$10,000$$