CHAPTER 4

Building a Framework For Cost Accounting

REVIEW QUESTIONS:

4.1 A Cost accounting system (CAS) is used to accumulate the cost of a project, process, product, service, or other cost object. Cost is determined through direct tracing of direct cost elements (direct materials, direct labor, direct technology) and through allocation techniques for indirect cost elements (overhead).

A CAS serves financial accounting by providing cost information for valuing COGM and COGS, and the ending RMI, WIP, and FGI balances. The CAS is a subset of the management accounting system, providing managers and workers with cost information for planning, control, and performance evaluation decisions.

4.2 The overall goal of a CAS is to determine the cost of products or services. The cost of a product or service is used for many purposes:

- Evaluate how well the organization is doing relative to its budget.
- Facilitate continuous improvement.
- Derive the value of inventory and cost of goods manufactured and sold for financial reporting.
- Value inventory for taxation.
- Price products or bid on contracts for various jobs.
- Determine product or job profitability.
- Decide whether to make or buy certain components.

4.3 All product costs are based on assumptions, estimates, allocations and averages. See the "Let's Talk" box on the next page.

Let's Talk

Students understand that overhead costs need to be allocated in calculating the cost of a product or service. Some have asked, though, if direct materials and direct labor are also based on estimates and allocations.

At this stage of the course, you may wish to discuss (briefly) how direct materials costs might be calculated. For example, should freight (delivery to RMI) costs be included in the direct materials cost? If so, the freight costs probably will be averaged over the direct materials purchased.

On a more sophisticated level, should scrap be included in the cost of direct materials? In traditional CASs, expected scrap costs usually are estimated and included in the cost of a product. Proponents of WCM might argue that scrap should be estimated (or directly measured if possible) and not included in the cost of a product. Scrap should be accounted for separately so that it can be highlighted and eliminated.

Direct labor costs also contain estimates and allocations. For example, labor costs may include estimates for break time, machine setup time, bathroom time, and the like. As seen in Exhibit 4-10, direct labor costs include payroll taxes and fringe benefits. Some of these costs are fixed costs that are allocated into one hour's cost of labor. Some are estimates. You may wish to ask if any of your students have worked in a payroll department. What costs did they include in direct labor? How were these costs determined?

On a more sophisticated level, how are direct labor costs assigned to products in a JIT cell? Some argue that a commitment to continuous employment results in direct labor becoming a fixed cost of a JIT cell. Then the amount to be included in the cost of a product must be estimated and allocated.

Issues in accounting for scrap are discussed further in Chapters 5, 6, 7 and 8. More sophisticated issues involved in budgeting and accounting for direct labor are discussed in Chapters 7 and 8.

4.4
- *Direct materials* — Raw materials are readily identifiable parts of a product or service, allowing their costs to be directly traced to the product or service.
- *Direct labor* — People who work specifically on manufacturing a product or performing a service, and whose time can be directly traced to that product or service.
- *Variable overhead* — Indirect manufacturing costs that are constant per unit and vary in total with production volume.
- *Fixed overhead* — Indirect manufacturing costs that are constant in total (for a given time period) and vary inversely with production volume when expressed on a per unit basis.

Let's Talk

Some students may comment that they had to go back to Chapter 1 and review that material. You may wish to make two points in response to comments such as this:

True learning is a continuous, on-going process. Of course, everyone should go back and review previously covered materials, asking themselves how specific ideas, calculations, and the like, apply to current topics. This is a characteristic of a high quality student and professional. In their careers, accountants constantly go back to materials learned in school, and research new concepts, applications, and problems. Thus, it is critical to begin building a personal professional library of accounting and related texts along with class notes.

The second point is that the first paragraph of the section "Overview of the Four Manufacturing Cost Elements" states that they should go back to Chapter 1 and review this material.

Some students may list the 4 inputs as: direct materials, direct labor, overhead, and direct technology. This is not wrong. It is a good insight. The point of separating VOH and FOH is to get students to think about the need to account for these costs separately. You may wish to relate this back to what they learned in their introductory management accounting course concerning overhead cost variances. You may also wish to consider the expected answer to this question by those grading the CPA, CMA, or CIA exam.

4.5
- Direct materials:
  - Lumber used in building a house
  - The cost of a textbook for a course
  - Tires on an automobile
  - Crutches, and other special devices in a hospital emergency room
- Direct labor:
  - Carpenters building a house
  - Assemblers on an assembly line
  - Cell workers in a JIT cell
  - Physicians and surgeons
- Variable overhead:
  - Factory supplies (indirect materials such as lubricants, saw blades, or drill bits)
  - Utilities (electricity)
  - Indirect labor (material handlers)
  - Bandages and sutures in a hospital operating room
- Fixed overhead:
  - Depreciation on the factory building and equipment
  - Taxes and insurance on the factory building and equipment
  - Salaries of factory managers
  - Hospital administrators

4.6
- *Direct cost*: A cost that is directly traced to a product, service, or other cost object.
- *Indirect cost*: A cost that is not directly traced to the product, service, or other cost object. Indirect costs are classified as overhead and are allocated in cost assignment.

4.7 Work-in-process inventory

4.8 Raw materials inventory

4.9 Finished goods inventory

4.10
- In a periodic system, the finished goods inventory account balance is based on a physical inventory count at the date financial statements are prepared. COGS is calculated based on the COGM statement illustrated in Chapter 1 (Exhibit 1-3). COGM plus the beginning FGI balance minus the ending FGI balance equals COGS.
- In a perpetual system, FGI is adjusted on a continual basis using point-of-sale equipment and online databases. COGS is also recorded at the same time. Bar code scanning equipment, similar to point-of-sale equipment, can be used to maintain a perpetual inventory system for RMI and WIP.

4.11 • *Process cost system*: Continuous, mass production often moving through multiple production departments. Some JITs producing large quantities of the same product use process cost systems to account for production cell costs.

• *Job order cost system*: Unique products are individually manufactured (or manufactured in small unique batches). If many cost elements can be directly traced to an individual product, such as when the product has a long lead time, a job order cost system can be used for JIT cells. Various profit and not-for-profit service firms can use job order cost systems, such as CPA and legal firms, welfare agencies, and charitable organizations.

4.12 A hybrid cost system uses a combination of job order and process costing techniques. It is used by organizations that have custom production in some operations based on a standard product design and operations in other departments. The mushroom concept (discussed in Chapter 1) is often supported by a hybrid cost accounting system.

4.13 • Acquiring manufacturing cost elements:
The first type (or group) of journal entries records the acquisition of cost elements. Temporary holding accounts (see Review Question 4.14) are debited for the costs of raw materials, production labor, and overhead.

• Using manufacturing cost elements:
The second type of journal entries records the use of raw materials, factory labor, and overhead items in the actual manufacturing of products. As cost elements are used in production, they are debited to a WIP subsidiary ledger account that accumulates product costs. Also see Review Questions 4.15 and 4.16.

• Completed production journal entries:
The final type of journal entries records the transfer of completed production out of the factory (credit WIP) and into retail outlets for sale to customers (debit FGI). When sold, the product costs are moved from FGI into COGS.

4.14 • Raw materials are purchased before they are needed in production. Their costs need to be accumulated in temporary holding accounts until used in actual production.
• Direct labor costs include gross wages, payroll taxes, and fringe benefits. These costs need to be accumulated in a temporary holding account until proper assignment can be made of the total payroll-related costs to the products.
• Overhead consists of many indirect cost elements. These also need to be combined and allocated to product costs. Thus, a temporary holding account is also needed for overhead.

4.15 When used in production, all cost elements are debited to a work-in-process subsidiary account for the cost of the products. The purpose of this subsidiary WIP account is to accumulate the total costs of making products. Consequently, all cost elements used in production should be accumulated in the same WIP subsidiary account.

4.16 The three journal entries recording the usage of cost elements are direct materials usage, direct labor distribution, and overhead allocation. In all three journal entries, the appropriate temporary holding accounts are credited, i.e., credit RMI for raw materials used, credit gross wages for labor used, and credit overhead for indirect cost elements used.

4.17 The product's cost is accumulated in the subsidiary general ledger account titled "WIP-Product cost."

4.18 A control account is the master account for a series of related specific accounts. Subsidiary accounts are the specific accounts used to accumulate individual items. For example, each customer may have a separate subsidiary account within the accounts receivable control account so that the customer's account balance and history can be accounted for separately from other customers.

4.19 Some raw materials used and some labor costs are not directly traceable to products made. These indirect materials and indirect labor costs need to be accumulated in the temporary holding account "overhead" along with other indirect costs. Once all indirect costs are grouped together, the total overhead costs can be allocated in some manner into the costs of the products.

4.20 The total balance in the WIP control account is unaffected by overhead allocations. The overhead allocation journal entry debits the WIP subsidiary account for product costs, and credits the overhead WIP subsidiary account. Thus, the overhead allocation journal entry only relocates amounts within WIP control. Nothing is added to, or subtracted from, the WIP control account.

4.21 Applied overhead is a particular type of allocated overhead. It is the amount of overhead cost added to the cost of a product. Applied overhead is calculated by using an overhead rate multiplied by the amount of some other direct cost element used in making the product that is believed to cause the overhead.

4.22
- Indirect costs are not directly traceable to a specific product. To include them in the cost of a product, overhead items need to be grouped together into a temporary holding account.

- Some overhead items are paid for at a different time from when they are used in production. These cost elements need to be placed into a temporary holding account until they are needed in production.

4.23 The four rules for making basic CAS journal entries are:

- When cost elements are purchased, debit their holding accounts.
- When cost elements are used, credit their holding accounts, and debit WIP inventory.
- When cost elements are used in making a product, and added to WIP, a subsidiary WIP account always must be debited: the product's cost account for direct materials and direct labor, or overhead for the indirect costs such as indirect materials and indirect labor.
- When overhead is used in making a product, debit the product's cost subsidiary WIP account, and credit the overhead subsidiary WIP account.

4.24 • A subsidiary account is used to provide a separate record of individual items. A posting reference identifies different items within an account, leaving an audit trail to their journal entries. If many items need separate accounting and control, subsidiary general ledger accounts should be used for each item. If only a few items are included within an account, and only identification of them is needed, then a posting reference usually will suffice.

- Subsidiary accounts are separated from their control accounts by dashes. Posting references are shown in parentheses at the end of an account title within a journal entry.

4.25 Actual overhead costs are debited to the overhead account.
Allocated overhead costs are credited to the overhead account.

4.26 • Purchase order and receiving report
- Materials requisition
- Time tickets

4.27 • Purchase order:
  - Authorizes the supplier to ship raw materials.
  - Purchasing department originates the order.
  - One copy accompanies the original PO sent to the supplier to serve as a shipping advice. Another copy is sent to the inventory supervisor alerting him or her that the shipment is pending. A third copy is sent to the accounts payable department to notify it that an invoice is forthcoming.

- Receiving report:
  - Documents the receipt of a shipment from a supplier.
  - Receiving personnel (or a RMI clerk) originate the receiving report.
  - One copy is sent to the accounts payable department that is used in combination with the purchase order and invoice to authorize payment.

- Receiving log:
  - Summarizes receiving reports originated at the receiving dock and serves to control documents (verifying no missing receiving reports). It is also useful for controlling the payment of freight bills and for summarizing receiving activity.
  - RMI supervisor prepares a daily log.
  - A copy is sent to accounts payable as a control document for the receiving reports sent it. A second copy is sent to the purchasing department so that they can verify that all purchase orders have been received.

- Rejected material report:
  - Identifies materials to be returned to the vendor.
  - Originated by RMI personnel.
  - One copy accompanies the returned materials to the vendor. The purchasing department receives a copy to use in evaluating vendor performance. Another copy is sent to accounts payable authorizing nonpayment for the materials returned.
- Materials requisition:
  - Requests raw materials to be delivered from RMI to production.
  - Originated by the factory supervisor or a central scheduling department (e.g., created by the MRP II program).
  - A copy accompanies the original sent to RMI. This copy is returned with the materials when they are delivered to the shop floor. This copy is then forwarded to cost accounting to serve as the source document for the materials requisition journal entry. The factory department receiving the materials may keep a copy for their records.

- Time tickets:
  - Used to assign direct labor to a specific product and indirect labor to overhead.
  - Originated by the employee or generated by an MRP II program.
  - The original or a copy may be kept by the production supervisor (or production control) to reconcile labor time and usage. The original or a copy is sent to the payroll department (or cost accounting department) to serve as a source document for the labor distribution journal entry.

4.28 The key fields in a materials record include:

- Model number (or item number)
- Part number
- Description (or name)
- Unit cost
- Quantity received from vendor (also often indicated by unit of measure, such as pounds, gallons, or feet)
- Purchase order number
- Date received
- Quantity issued to production
- Materials requisition number
- Job order number or department number to which direct materials are charged
- Date issued to production
- Quantity on hand after the most current issue
- Reorder quantity, which will trigger a purchase order when the quantity on hand is equal to or less than the reorder quantity
- Quantity ordered (economic order quantity)

4.29 The objectives of a payroll system include:

- Ensure accurate and prompt payment of employees.
- Maintain records of employee earnings.
- Withhold and pay payroll taxes accurately and on time.
- Journalize labor costs to the proper general ledger accounts.

4.30 The following costs are included in direct and indirect labor:

- Basic compensation
- Individual production efficiency bonuses
- Group production efficiency bonuses
- Sick leave credit
- Health insurance
- Vacation pay
- Union dues paid by the employer
- Pension costs and other post-retirement benefits
- Employer's share of Federal Insurance Contributions Act (FICA) taxes
- Worker's compensation insurance expense
- State or federal unemployment compensation insurance

4.31 • Mandatory withholdings are required by law or legal agreement. Examples include federal, state, and local income taxes, and social security taxes.

- Voluntary withholdings are at the discretion of the employees. Examples include union dues, health insurance, and retirement plans.

4.32 • Mandatory payroll burden costs are required by law or legal agreement. Examples include federal and state unemployment taxes, local employment taxes, and social security taxes.

• Voluntary payroll burden costs are at the discretion of the employees. Examples include vacation time, health insurance, and voluntary retirement plan contributions.

4.33 There are at least three ways to account for employee withholdings and the employer's burden within the two current liability accounts used in journal entries 2 and 3:

- Individual line items (shown in Exhibit 4-10) could be treated as posting references within the two liability accounts.
- Individual line items could be set up as separate subsidiary ledger accounts within each liability account. With this method "Wages and Payroll Withholding Payable" and "Employer's Payroll Burden Payable" become control accounts in the CAS.
- The two liability accounts could be replaced with separate liability accounts for each line item.

4.34 Reasons for a subsidiary ledger account for overhead:

- Overhead represents the indirect product costs that cannot be directly traced to the cost of the product.
- Many overhead costs are incurred and paid for at different times from when these cost elements are used in the manufacturing process.
- Overhead costs need to be pooled together and then allocated with some systematic method into the cost of the product.
- Overhead costs need to be accounted for separately to satisfy the cost management needs of the enterprise.

4.35 Cost system choices:

a. Normal cost system
b. Standard cost system
c. Actual cost system

4.36 *PORs are used rather than actual overhead rates for four related purposes:*

- To calculate an appropriate amount of overhead to be included in the cost of products or services.
- To enable overhead allocation to be made in a timely manner, rather than waiting until total actual overhead costs and hours worked become known at the end of the year.
- To provide timely product cost information for journal entries transferring completed products from WIP to FGI, and from FGI to COGS.
- To normalize the overhead charge: PORs smooth out uncontrollable fluctuations in actual overhead costs that are unrelated to activity or volume levels. Actual overhead rates, if calculated monthly for example, often vary due to seasonal factors.

An example of a POR:

$$\text{TOH POR} = \frac{\text{Total budgeted annual overhead cost}}{\text{Total budgeted annual direct labor hours}}$$

$$\text{\$4.00 per DLhr} = \frac{\$240{,}000}{60{,}000 \text{ direct labor hours}}$$

4.37 A POR uses budgeted amounts while an actual overhead rate (AOR) uses actual amounts. Using budgeted amounts, the POR is calculated at the beginning of the year (or other accounting period chosen by management). If an AOR is calculated, it must be done at the end of year when total actual overhead costs and direct labor hours (or other basis) are known.

4.38 The numerator is the total budgeted annual overhead cost and the denominator is the total budgeted annual direct labor hours (or other basis used to allocate overhead into the cost of a product).

4.39 Overhead allocated to products may be over- or underapplied for two reasons:

- The numerator of the POR is total budgeted overhead cost. If the actual overhead costs are less than the amount budgeted, overapplied overhead can result. If the actual overhead costs are greater than the amount budgeted, then underapplied overhead can result.
- The denominator of the POR is total budgeted direct labor hours (or some other basis chosen). If actual direct labor hours are less than the amount budgeted, underapplied overhead can result. If actual direct labor hours are greater than the amount budgeted, overapplied overhead can result.

Let's Talk

Students should have completed an introductory management accounting course as a prerequisite to this course. If so, and you feel they have sufficient mastery of that material, you may wish to relate over- and underapplied overhead to overhead spending and usage variances at this time. A comment is made about this in footnote 4 within the chapter.

You may also wish to discuss the different effects of variable and fixed overhead on over- and underapplied overhead. For example, if actual variable overhead costs are less than budgeted, but the actual direct labor hours are also proportionately less than budgeted, no ending overhead account balance will result due to the difference in budgeted and actual variable overhead costs or hours.

In contrast, if budgeted and actual fixed overhead costs are equal, but a difference exists between budgeted and actual direct labor hours, an over- or underapplied overhead balance will result. This reinforces the need to account for variable and fixed overhead costs separately as noted in the "Let's Talk" box for Review Question 4.4.

4.40 When the year-end overhead account balance is significant, it should be reallocated to the products that used the overhead items. These products are in the ending balances of WIP and FGI, and COGS.

CHAPTER-SPECIFIC PROBLEMS:

4.41

> ***Let's Talk***
>
> Some students may have difficulty with the answers to items b, c, and d. These costs are first debited to the gross wages account, and then included in the labor rate used to distribute gross wages to the product's cost (for direct laborers) and to overhead (for indirect laborers).
>
> Technically speaking, the correct answer is both direct labor and overhead.

a. Direct materials
b. Direct labor and overhead (indirect labor)
c. Direct labor and overhead (indirect labor)
d. Direct labor and overhead (indirect labor)
e. Overhead (indirect materials)
f. Overhead (indirect labor)
g. Overhead (factory rent)
h. Overhead (factory insurance and taxes)
i. Overhead (supervisory salaries)
j. Overhead (indirect materials)

4.42

Let's Talk

CPA exam problems often require assumptions. Both in solving problems, and in the "real world," it is necessary for accountants to keep notes on where information comes from and any assumptions made. Noting assumptions is a good habit to develop now while they are students.

For example, to record journal entry 6 distributing gross wages to the product's cost and to overhead, we assume all factory workers incur the same amount of payroll taxes and fringe benefits costs.

So that students can re-create their solutions in studying for an exam, they should note their assumptions about how payroll taxes and fringe benefits (PT & FB) are allocated to direct labor and indirect labor. We have included a table approach you may wish to write on the chalkboard for their use.

Keeping notes is not limited to assumptions. Students should also leave themselves an "audit trail" showing how calculations were performed and the specific values used. Many of us require this type of documentation on exams for determining partial credit. Too often, though, students are not careful enough in preparing their homework solutions.

To "drive home" this very important idea to your students, give them a surprise quiz. Tell them you are their boss at work. They can use their solutions to this problem. They must reproduce their allocation of payroll taxes and fringe benefits to direct labor and indirect labor. How many left themselves an audit trail?

You may wish to emphasize the usability criterion of high quality management accounting information. How many homework problems were useful for this quiz? In other words, how many aspiring accountants produced high quality information in this situation?

Special calculations needed:

- Journal entry 5 (information item 9):
  Raw materials requisitioned = $342,000. If $40,000 is indirect materials (from information item 9), $302,000 must be direct materials.

- Journal entry 6 (information items 3, 4, and 10):

Item	Wages	Ratio	PT & FB allocation	Labor cost
Direct labor	$120,000	2/3	$31,200	$151,200
Indirect labor	60,000	1/3	15,600	75,600
Totals	$180,000	1	$46,800	$226,800

- Journal entry 7 (information item 11):
  $151,200 x 120% = $181,440

Notes to T-accounts:

- Problem 4.43 requires journal entries for this problem. The journal entry numbers are shown next to the amounts within each T-account.
- BB = Beginning balance
  EB = Ending balance

Let's Talk

Terminology and format confusions

Part b, COGM statement:
Some students will have an incorrect answer because they did not subtract indirect materials (IM) used from RMI used when calculating DM used. This is illustrated and discussed in demonstration problem 2. This error is caused by not properly distinguishing between raw materials and direct materials. They are *not* synonyms. Direct materials are a subset of RMI. To give this concreteness, you may wish to emphasize that DM and IM are subsidiary ledger accounts within RMI.

Additionally (no pun intended), have students compare their journal entries and T-accounts to the COGM statement amounts. In journal entry 1, did they use $342,000 of RMI (the journal entry credit)? How much of it was DM used and IM used (the debits)? What are their values for DM used in the COGM statement?

Part c, COGS statement:
The year-end closing journal entry for the ending overhead balance is not included in the 9 basic journal entries (Problem 4.43) or in the T-accounts in part a. As a result, COGS in the T-accounts is not the same as COGS on the COGS statement. You may wish to write the following reconciliation on the chalkboard:

Unadjusted COGS of $633,640 - Overapplied OH of $15,840 = Adjusted COGS of $617,800.

You also may wish to mention these potential difficulties *before* assigning Problems 4.42 and 4.43.

4.42a

Raw Materials Inv.		
BB	$22,000	
#1	$350,000	$342,000 #5
EB	$30,000	

Gross Wages		
#2	$180,000	
#3	$46,800	$226,800 #6
EB	$0	

WIP - Mfg. Overhead		
BB	$0	
#4 (taxes)	$15,000	
#4 (depr.)	$5,000	
#4 (utils)	$30,000	$181,440 #7
#5=IM	$40,000	
#6=IL	$75,600	
EB		$15,840 overapplied

WIP - Product Costs		
BB	$40,000	
#5=DM	$302,000	
#6=DL	$151,200	$626,640 #8
#7=OH	$181,440	
EB	$48,000	

Finished Goods Inv.		
BB	$25,000	
#8	$626,640	$633,640 #9
EB	$18,000	

Cost of Goods Sold		
#9	$633,640	

4.42b,c

Baker Company
Schedule of Cost of Goods Manufactured
For the Year Ended December 31, 19X6

Raw materials inventory:		
Beginning inventory	$22,000	
Raw materials purchases	350,000	
Raw materials available	$372,000	
Less ending inventory	(30,000)	
Raw materials used	$342,000	
Less indirect materials used	(40,000)	
Direct materials used		$302,000
Direct Labor		151,200
Manufacturing overhead applied		181,440
Total manufacturing costs		$634,640
Beginning WIP inventory		40,000
Less ending WIP inventory		(48,000)
Cost of goods manufactured		$626,640

Baker Company
Schedule of Cost of Goods Sold
For the Year Ended December 31, 19X6

Beginning finished goods inventory	$25,000
Cost of goods manufactured	626,640
Less overapplied overhead	(15,840)
Cost of goods available for sale	$635,800
Less ending finished goods inventory	(18,000)
Cost of goods sold	$617,800

4.43

Ref	General Ledger Account Titles	dr's	cr's	Notes:
	PURCHASE (ACQUISITION) OF RAW MATERIALS:			
1:	Raw Materials Inventory	$350,000		DM + IM (1 & 2)
	Accounts Payable		$350,000	all RMI purchases are charged
	PREPARING (RECORDING) PAYCHECKS:			
2:	Gross Wages	$180,000		DL + IL (3 & 4)
	FIT Withholdings Payable		$18,000	+$GROSS WAGES*0.1
	SIT Withholdings Payable		$9,000	+$GROSS WAGES*0.05
	FICA Taxes Payable		$13,500	+$GROSS WAGES*0.075
	Pension Plan Payable		$3,600	+$GROSS WAGES*0.02
	Health Insurance Payable		$2,700	+$GROSS WAGES*0.015
	Wages Payable		$133,200	GROSS WAGES - WITHHOLDINGS
	EMPLOYER'S PAYROLL TAXES & BENEFITS (BURDEN):			
3:	Gross Wages	$46,800		@SUM(G24..G29)
	FICA Taxes Payable		$13,500	= withheld from paychecks
	FUTA Taxes Payable		$1,440	+$GROSS WAGES*0.008
	SUTA Taxes Payable		$9,720	+$GROSS WAGES*0.054
	Pension Plan Payable		$9,000	+$GROSS WAGES*0.05
	Health Insurance Payable		$5,940	+$GROSS WAGES*0.033
	Vacation Payable		$7,200	+$GROSS WAGES*0.04
	OTHER OVERHEAD COSTS INCURRED:			
4:	WIP Inventory-Mfg. Overhead (property taxes)	$15,000		PROPERTY TAXES (5)
	WIP Inventory-Mfg. Overhead (depreciation)	$5,000		DEPRECIATION (6)
	WIP Inventory-Mfg. Overhead (Utilities)	$30,000		UTILITIES (8)
	Accounts Payable		$45,000	amounts charged (5 & 8)
	Accumulated Depreciation-Factory Equipment		$5,000	DEPRECIATION (6)
	REQUISITION OF RAW MATERIALS INTO THE FACTORY:			
5:	WIP Inventory-Product Cost (DM)	$302,000		have to calculate
	WIP Inventory-Manufacturing Overhead (IM)	$40,000		given (9)
	Raw Materials Inventory		$342,000	calculate from T-account
	DISTRIBUTING GROSS WAGES TO PRODUCTS:			
6:	WIP Inventory-Product Cost (DL)	$151,200		have to calculate
	WIP Inventory-Manufacturing Overhead (IL)	$75,600		have to calculate
	Gross Wages		$226,800	gross pay + employer burden
	OVERHEAD ALLOCATION TO PRODUCTS:			
7:	WIP Inventory-Product Cost (Applied Overhead)	$181,440		POR = 120% of DL$ (11)
	WIP Inventory-Manufacturing Overhead		$181,440	DL$ = $151,200 (JE 6)
	PRODUCTS COMPLETED:			
8:	Finished Goods Inventory	$626,640		COGM calculated within
	WIP Inventory-Product Cost		$626,640	T-account
	PRODUCTS SOLD (INVENTORY RELIEF JOURNAL ENTRY):			
9:	Cost of Goods Sold	$633,640		COGS calculated within
	Finished Goods Inventory		$633,640	T-account

4.44 Carson, Inc. journal entries:

Ref	General Ledger Account Titles	dr's	cr's	Notes:
PURCHASE (ACQUISITION) OF RAW MATERIALS:				
1:	Raw Materials Inventory	$200,000		given in a
	Accounts Payable		$200,000	all RMI purchases are charged
PREPARING (RECORDING) PAYCHECKS:				
2:	Gross Wages	$300,000		given in b
	FIT Withholdings Payable		$45,000	+$GROSS WAGES*0.15
	SIT Withholdings Payable		$15,000	+$GROSS WAGES*0.05
	FICA Taxes Payable		$22,500	+$GROSS WAGES*0.075
	Pension Plan Payable		$15,000	+$GROSS WAGES*0.05
	Health Insurance Payable		$6,000	+$GROSS WAGES*0.02
	Wages Payable		$196,500	GROSS WAGES - WITHHOLDINGS
EMPLOYER'S PAYROLL TAXES & BENEFITS (BURDEN):				
3:	Gross Wages	$79,867		@SUM(G23..G28)
	FICA Taxes Payable		$22,500	= withheld from paychecks
	FUTA Taxes Payable		$3,000	+$GROSS WAGES*0.01
	SUTA Taxes Payable		$15,000	+$GROSS WAGES*0.05
	Pension Plan Payable		$15,000	+$GROSS WAGES*0.05
	Health Insurance Payable		$6,000	+$GROSS WAGES*0.02
	Vacation Payable		$18,367	+$GROSS WAGES*(3/49)
OTHER OVERHEAD COSTS INCURRED:				
4:	WIP Inventory-Mfg. Overhead (other)	$100,000		given in d
	WIP Inventory-Mfg. Overhead (depreciation)	$400,000		given in d
	Accounts Payable		$100,000	given in d
	Accumulated Depreciation-Factory Equipment		$400,000	given in d
REQUISITION OF RAW MATERIALS INTO THE FACTORY:				
5:	WIP Inventory-Product Cost (DM)	$175,000		given in e
	WIP Inventory-Manufacturing Overhead (IM)	$15,000		"plug" to balance
	Raw Materials Inventory		$190,000	calculate from T-account
DISTRIBUTING GROSS WAGES TO PRODUCTS:				
6:	WIP Inventory-Product Cost (DL)	$250,000		given in f
	WIP Inventory-Manufacturing Overhead (IL)	$129,867		have to calculate
	Gross Wages		$379,867	gross pay + employer burden
OVERHEAD ALLOCATION TO PRODUCTS:				
7:	WIP Inventory-Product Cost (Applied Overhead)	$650,000		POR = 260% of DL$ (g)
	WIP Inventory-Manufacturing Overhead		$650,000	
PRODUCTS COMPLETED:				
8:	Finished Goods Inventory	$990,000		COGM calculated within
	WIP Inventory-Product Cost		$990,000	T-account
PRODUCTS SOLD (INVENTORY RELIEF JOURNAL ENTRY):				
9:	Cost of Goods Sold	$965,000		COGS calculated within
	Finished Goods Inventory		$965,000	T-account

4.44 Carson, Inc. T-accounts:

Raw Materials Inv.

BB	$10,000	
#1	$200,000	$190,000 #5
EB	$20,000	

Gross Wages

#2	$300,000	
#3	$79,867	$379,867 #6
EB	$0	

WIP - Mfg. Overhead

BB	$5,000	
#4 (other)	$100,000	
#4 (depr.)	$400,000	
#5=IM	$15,000	$650,000 #7
#6=IL	$129,867	
EB		$133 overapplied

WIP - Product Costs

BB	$195,000	
#5=DM	$175,000	
#6=DL	$250,000	$990,000 #8
#7=OH	$650,000	
EB	$280,000	

Finished Goods Inv.

BB	$75,000	
#8	$990,000	$965,000 #9
EB	$100,000	

Cost of Goods Sold

#9	$965,000	

4.45 Jansen Skiwear journal entries:

Ref	General Ledger Account Titles	dr's	cr's	Notes:
	PURCHASE (ACQUISITION) OF RAW MATERIALS:			
1:	Raw Materials Inventory	$80,000		given in a
	Accounts Payable		$80,000	all RMI purchases are charged
	PREPARING (RECORDING) PAYCHECKS:			
2:	Gross Wages	$100,000		given in b
	FIT Withholdings Payable		$28,000	+$GROSS WAGES*0.28
	SIT Withholdings Payable		$6,000	+$GROSS WAGES*0.06
	CIT Withholdings Payable		$1,000	+$GROSS WAGES*0.01
	FICA Taxes Payable		$7,500	+$GROSS WAGES*0.075
	Union Dues Payable		$2,000	+$GROSS WAGES*0.02
	Health Insurance Payable		$1,000	+$GROSS WAGES*0.01
	Wages Payable		$54,500	GROSS WAGES - WITHHOLDINGS
	EMPLOYER'S PAYROLL TAXES & BENEFITS (BURDEN):			
3:	Gross Wages	$29,033		@SUM(G23..G28)
	FICA Taxes Payable		$7,500	= withheld from paychecks
	FUTA Taxes Payable		$700	+$GROSS WAGES*0.007
	SUTA Taxes Payable		$2,500	+$GROSS WAGES*0.025
	Pension Plan Payable		$5,000	+$GROSS WAGES*0.05
	Health Insurance Payable		$5,000	+$GROSS WAGES*0.05
	Vacation Payable		$8,333	+$GROSS WAGES*(4/48)
	OTHER OVERHEAD COSTS INCURRED:			
4:	WIP Inventory-Mfg. Overhead (other)	$90,000		given in d
	WIP Inventory-Mfg. Overhead (depreciation)	$200,000		given in d
	Accounts Payable		$90,000	given in d
	Accumulated Depreciation-Factory Equipment		$200,000	given in d
	REQUISITION OF RAW MATERIALS INTO THE FACTORY:			
5:	WIP Inventory-Product Cost (DM)	$65,000		given in e
	WIP Inventory-Manufacturing Overhead (IM)	$12,500		"plug" to balance
	Raw Materials Inventory		$77,500	calculate from T-account
	DISTRIBUTING GROSS WAGES TO PRODUCTS:			
6:	WIP Inventory-Product Cost (DL)	$75,000		given in f
	WIP Inventory-Manufacturing Overhead (IL)	$54,033		have to calculate
	Gross Wages		$129,033	gross pay + employer burden
	OVERHEAD ALLOCATION TO PRODUCTS:			
7:	WIP Inventory-Product Cost (Applied Overhead)	$350,000		POR = $350 * 1,000 DLhrs (g)
	WIP Inventory-Manufacturing Overhead		$350,000	DLhours from f
	PRODUCTS COMPLETED:			
8:	Finished Goods Inventory	$490,000		COGM calculated within
	WIP Inventory-Product Cost		$490,000	T-account
	PRODUCTS SOLD (INVENTORY RELIEF JOURNAL ENTRY):			
9:	Cost of Goods Sold	$535,000		COGS calculated within
	Finished Goods Inventory		$535,000	T-account

4.45 Jansen Skiwear T-accounts:

Raw Materials Inv.

BB	$5,000	
#1	$80,000	$77,500 #5
EB	$7,500	

Gross Wages

#2	$100,000	
#3	$29,033	$129,033 #6
EB	$0	

WIP - Mfg. Overhead

BB	$0	
#4 (other)	$90,000	
#4 (depr.)	$200,000	
#5=IM	$12,500	$350,000 #7
#6=IL	$54,033	
EB	$6,533	

underapplied

WIP - Product Costs

BB	$20,000	
#5=DM	$65,000	
#6=DL	$75,000	$490,000 #8
#7=OH	$350,000	
EB	$20,000	

Finished Goods Inv.

BB	$75,000	
#8	$490,000	$535,000 #9
EB	$30,000	

Cost of Goods Sold

#9	$535,000	

4.46

Carley Products
Income Statement
For the Year Ended December 31, 19X5

Sales		$3,600,000
Cost of goods sold	$2,040,000	
+ Underapplied overhead	52,000	
Adjusted COGS		<2,092,000>
Gross margin		$1,508,000
Less general selling and administrative expenses		<900,000>
Net income		$608,000

4.47 *Company A's overhead account:*

$$\text{TOH POR} = \frac{\text{Budgeted TOH cost}}{\text{Budgeted machine hours}}$$

$$\$2.00 \text{ per Mhr} = \frac{\$100,000}{50,000 \text{ Mhr}}$$

$$\text{Applied overhead} = \text{TOH POR} \times \text{Actual Mhr}$$

$$\$94,000 = \$2.00 \times 47,000$$

WIP - Manufacturing Overhead

(actual)	$95,000	$94,000	(applied)
	$1,000		
	underapplied		

4.47 *Company B's overhead account:*

$$\text{TOH POR} = \frac{\text{Budgeted TOH cost}}{\text{Budgeted DL cost}}$$

$$150\% \text{ of DL Cost} = \frac{\$120,000}{\$80,000}$$

$$\text{Applied overhead} = \text{TOH POR} \times \text{Actual DL cost}$$

$$\$133,500 = 150\% \times \$89,000$$

WIP - Manufacturing Overhead

(actual)	$130,000	$133,500 (applied)
		$3,500 overapplied

b. Actual overhead costs need to be included in the cost of the goods manufactured and sold. The amount of overhead added to the product costs is called applied overhead. Ultimately, when preparing financial statements, applied overhead (in total) must equal the total actual overhead incurred.

Two methods (cost systems) can be used to accomplish this. In an actual cost system, an actual overhead rate (AOR) is calculated. The difficulty with this cost system is that the actual overhead costs (and actual allocation basis amount, e.g., direct labor hours or machine hours) will not be known until the end of the year. In setting sales prices, management cannot wait until year-end for this calculation. Sales prices must be set in advance, and must be high enough to cover all direct and indirect costs. To satisfy this management information need, a normal cost system is used.

In a normal cost system, overhead and its allocation basis are *estimated* at the beginning of the year (or other reporting period) and an *estimated* overhead rate is determined (a POR). Using the POR, estimated overhead is applied to the products as they are being manufactured. The costs of completed production will then include actual direct materials and labor, plus an estimated amount of overhead. If overhead is accurately budgeted and properly controlled, the actual and applied overhead will be equal by year-end. If not, any remaining balance (difference) is included in the products' costs via a closing journal entry.

4.48

$$\text{TOH POR} = \frac{\text{Budgeted TOH cost}}{\text{Budgeted direct labor hours}}$$

$$\$1.20 \text{ per DLhr} = \frac{\$720{,}000}{600{,}000 \text{ DLhr}}$$

$$\text{Applied overhead} = \text{TOH POR} \times \text{Actual DLhr}$$

$$\$660{,}000 = \$1.20 \times 550{,}000$$

WIP - Manufacturing Overhead			
(actual)	$680,000	$660,000	(applied)
	$20,000		
	underapplied		

4.49

Accounts affected:	Year-end balances	Ratio	Proration
WIP inventory	$54,000	6.25000%	$2,812.50
Finished goods inventory	$90,000	10.41667%	$4,687.50
Cost of goods sold	$720,000	83.33333%	$37,500.00
	$864,000	100%	$45,000.00

Underapplied overhead is added to the ending account balances.

$$\text{COGS} = \$720{,}000 + \$37{,}500 = \$757{,}500$$

4.50

Let's Talk

Some students considered parts c and d to be "trick questions." They correctly pointed out that over- or underapplied overhead should not be closed to COGS or prorated to the ending balances in WIP, FGI, and to COGS at the end of a month. This is true if the POR is not to be changed at the end of that particular month. This is a valuable insight demonstrating that these students are thinking about the concepts presented, rather than just blindly performing calculations.

We have used this positive response in an attempt to diffuse any possible bad feelings students may develop. You may also wish to make the following two points:

- CPA (as well as CMA) exam questions must be read very carefully. An observation, such as the one above, deserves at least a footnote comment in preparing their answers.

- Reading parts c and d carefully, though, indicates that these are "what if" questions. They begin with "What *would*...." Technically speaking, the answers presented below are correct from this perspective. If the questions were phrased differently, such as, "What *should be done* with the ending monthly overhead balance?", the correct answer would be to leave it in the account. Management expects temporary balances from month-to-month. By the end of the year, though, there should be no ending balance if overhead was accurately budgeted at the beginning of the year, and effectively controlled throughout the year.

4.50 Parts a, b, and c:

Note: Special teaching transparency available (Problem 4.50TT)

Summit Company
Schedule of Cost of Goods Manufactured
For the Month Ended January 31, 19XX

Direct materials inventory:			
Beginning inventory	$30,000		
Direct materials purchases	200,000		a
Direct materials available	$230,000		
Less ending inventory	(40,000)		
Direct materials used		$190,000	
Direct Labor		180,000	b
Manufacturing overhead applied		150,000	
Total manufacturing costs		$520,000	
Beginning WIP inventory		15,000	
Less ending WIP inventory		(20,000)	
Cost of goods manufactured		$515,000	

Summit Company
Schedule of Cost of Goods Sold
For the Month Ended January 31, 19XX

Beginning finished goods inventory	$65,000	
Cost of goods manufactured	515,000	
Less overapplied overhead	(6,000)	
Cost of goods available for sale	$574,000	
Less ending finished goods inventory	(50,000)	
Cost of goods sold	$524,000	c

4.50 Part d:

Note: The COGS amount of $530,000 is the unadjusted balance ($524,000 adjusted balance shown in part c, with the overapplied overhead of $6,000 added back).

Accounts affected:	Month-end balances	Ratio	Proration
WIP inventory	$20,000	3.3333%	$200
Finished goods inventory	$50,000	8.3333%	$500
Cost of goods sold	$530,000	88.3333%	$5,300
	$600,000	100%	$6,000

Overapplied overhead is subtracted from the ending account balances.

COGS = $530,000 - $5,300 = $524,700

THINK-TANK PROBLEMS:

4.51 a. *Direct labor* can be directly traced to a cost object such as a product or service. This is accomplished through a source document, such as a time ticket, or through automated tracking systems such as touch screens or bar code scanners at a workstation. An example of direct labor is the hours spent by an artist in creating a painting.

Indirect labor cannot be easily traced to a particular product or service (or management chooses not to trace this directly because of the cost involved in attempting direct tracing, and/or the insignificance of the labor cost involved). Often, indirect labor is a common cost applicable to many products. For example, the time involved by an artist in obtaining supplies is an indirect labor cost because the supplies are used on more than one painting.

b. *Nonproductive labor included in direct labor:*
Some types of nonproductive labor are normal, unavoidable, and/or required by law. Examples include break time and bathroom time. Thus, the amount of time that is budgeted (and must be paid for) as direct labor includes both productive time directly working on a product or service plus an allocation of this nonproductive time. Budgeting the direct labor standard quantity so that it includes a proper amount of this type of nonproductive time is covered in Chapter 7.

Nonproductive labor classified as indirect labor:
Other types of labor time, such as downtime and training time, are classified as indirect labor costs because these activities are (potentially) avoidable and not attributable to an individual product. One of the characteristics of a world-class manufacturer is total quality management (TQM). TQM avoids, or minimizes, the amount of machine and associated labor downtime. One of the techniques of TQM is total preventive maintenance (TPM). TPM requires proper training of the workers so that they can perform maintenance activities as part of their normal duties.

In measuring TQM costs, the modern management accountant accounts for these costs separately (such as within a separate overhead subsidiary ledger account), rather than including them in direct labor. TQM and TPM were introduced in Chapter 2 and are discussed in greater detail in Chapter 12.

c. • Costs associated with efficiency bonuses, FICA, insurance, and vacations are budgeted for by management and/or required by law. These types of costs are directly traceable to individual laborers. Thus, they can be included within the effective labor rate of those workers. If the workers are direct laborers, then these costs become part of the direct labor rate used to cost products.

• While the costs of wage continuation plans, cafeterias, the personnel department, and recreational facilities are labor-related costs, they cannot be associated directly with individual employees. Or, the benefits from direct tracing for product costing and cost management are not considered to be worth the extra costs involved to do this. Consequently, they are common, indirect costs and included in overhead. If they could be directly traced to each employee, then these costs could be included within the direct labor rate.

• In choosing to classify these costs (maintenance, and overtime and shift premiums) as direct labor or overhead, the question involves the costs and benefits of attempting to trace them directly to individual workers and products. In some situations, the cost object (e.g., a product) is physically large enough, with a long production lead time. Many costs can be directly traced to such a product. For example, Boeing's construction of a 747 jet may have a lead time of up to one year. The construction of a 20-story office building may take 2 years. In these situations, many costs can be directly traced to the product.

In other situations, such as the production of milk and related dairy products, these types of costs usually are not associated with individual products or even production runs. Although it is possible to create sophisticated tracking systems to trace these costs to products directly, the cost of such systems may be greater than the marginal utility of any better management control or product cost information that results. Therefore, management decides not to attempt to trace these types of costs directly, and instead, to include them in overhead.

4.52 ***Note:*** Special teaching transparency available (Problem 4.52TT)

Helper Corporation
Schedule of Cost of Goods Manufactured
For the Year Ended 12/31/XX

Direct materials used	(solve: requirement c)	$370,000
Direct labor	(solve: requirement b)	360,000
Overhead applied	(solve: requirement a)	270,000
Total manufacturing costs	(given)	1,000,000
Beginning WIP inventory	(80% of ending WIP)	120,000
Less ending WIP inventory	(solve: requirement d)	<150,000>
Cost of goods manufactured	(given)	$970,000

LOGICAL ORDER FOR SOLUTION:

a. Applied overhead = 27% of total manufacturing costs
= 27% x $1,000,000
= $270,000

b. Applied overhead = 75% of DL cost
Direct labor = Applied overhead ÷ 75%
= $270,000 ÷ 75%
= $360,000

c. Direct materials + Direct labor + Applied overhead = Total manufacturing costs
Direct materials = Total manufacturing costs - Direct labor - Applied overhead
= $1,000,000 - $360,000 - $270,000
= $370,000

d. Total manufacturing costs + Beginning WIP - Ending WIP = COGM
Given: Beginning WIP = 80% x Ending WIP
Substituting:
Total manufacturing costs + (0.8 x Ending WIP) - Ending WIP = COGM
Ending WIP = (Total manufacturing costs - COGM) ÷ 0.2
= ($1,000,000 - $970,000) ÷ 0.2
= $150,000
Beginning WIP = 80% x Ending WIP
= 80% x $150,000
= $120,000

See "Let's Talk" box on the next page.

Let's Talk

This is the second CPA exam problem that requires a thorough understanding of the relationships captured on the COGM statement coupled with algebraic skills. (The first problem was Problem 1.36.)

In class, we stress the importance of the relationships of overhead to its cost driver (allocation basis), the COGM format, and math skills, both ethically (the competence criterion) and practically (passing the exam) as often as possible.

4.53 a. Factory overhead includes all costs of production that are not directly traced to products (i.e., all costs other than direct materials, direct labor, and direct technology). Typical examples include:

- Indirect materials (factory supplies such as tape, glue, nuts and bolts)
- Indirect labor (materials handlers, janitors, security guards for the plant)
- Other costs (utilities to heat and air condition the plant, insurance, taxes)

b. In calculating the cost of a product, both direct and indirect manufacturing costs should be included. Indirect costs, by definition, are not directly traceable to products. Thus, some method must be created to assign these indirect costs. One method is to calculate a rate for overhead costs based on a directly traceable cost element, and then use that rate (an AOR or POR) to allocate overhead to the costs of the product. In this way, overhead costs can be included in the product's manufacturing cost.

c. Moss Manufacturing uses a normal cost system with a POR based on direct labor cost. This is a very typical system in traditional manufacturing enterprises. No matter what basis is used to allocate overhead, the total overhead cost will be allocated to the costs of the products (after the year-end closing journal entry is made for any over- or underapplied overhead). To demonstrate this to the president, assume (for simplicity) that actual and budgeted overhead are equal, and that budgeted overhead base quantity equals the actual quantity:

Situation 1: Overhead allocated using direct labor cost.

Applied overhead = TOH POR x Actual direct labor cost
= 300% x $700,000
= $2,100,000

Situation 2: Overhead allocated using machine hours worked.

$$\text{TOH POR} = \frac{\text{Budgeted TOH cost}}{\text{Budgeted Machine hours}}$$

$$= \frac{\$2,100,000}{1,000,000 \text{ Mhr (assumed)}}$$

$$= \underline{\$2.10 \text{ per Mhr}}$$

$$\text{Applied overhead} = \text{TOH POR} \times \text{Actual Mhr used}$$

$$= \$2.10 \text{ per Mhr} \times 1,000,000 \text{ Mhr}$$

$$= \underline{\$2,100,000}$$

d. The president's confusion may be caused by three interacting factors:
- The reclassification of QC inspector salaries from direct labor to overhead.
- The use of one plantwide TOH POR.
- Using direct labor cost to allocate overhead.

This situation is an excellent example of the need for multiple overhead allocations and PORs. QC can be setup as a service center (discussed in Chapter 9) or activity (within an activity-based cost system discussed in Chapter 10) with its own POR. A number of benefits can be realized:
- The separate budgeting and allocation of QC costs can support the vice president's claims concerning the efficiency of the new system.
- Separate budgeting and allocation will facilitate better control over the QC costs.
- Use of a separate POR can result in better product costing through a more appropriate matching of the QC costs to the activities requiring QC.
- This use of a separate POR can support movement toward world-class manufacturing status through the implementation of a total quality management system (TQM). TQM is the topic of Chapter 12.

To illustrate this to the president, the management accountant might use the following example:

Budgeted QC costs = $100,000 per year
Budgeted rejects (spoilage) = 1,000 products
QC POR = $100 per reject.

Each reject identified can be costed $100 for the QC costs caused by it. This simple illustration assumes all rejects consume the same amount of QC activity. A further sophistication of the overhead allocation system would be to setup different rates for different product lines based on the amount of the QC activities required. This refinement would help to identify problem product lines that can be candidates for re-engineering and design of experiment techniques. These TQM techniques were introduced in Chapter 2 and further discussed in Chapter 12. Reengineering is described in Chapter 11.

4.54 *Traditional manufacturer:*

Benefits of a perpetual inventory system include:

- Timely and accurate tracking of inventory quantities.
- Cost management can be improved because a perpetual inventory system requires the use of per unit product costs.
- Reduction in the number and costs of physical inventories required.

Disadvantages of a perpetual inventory system include:

- Increased costs of individually tracking products through the production process.
- Increased costs of tracking direct materials and RMI.
- Increased costs of tracking FGI.

Periodic inventory system:

A periodic inventory system may be less costly to maintain depending upon the costs of taking physical inventories and their frequency. Cost management and quantities control, however, are not as effective. If these activities are important, separate information systems may be needed, increasing the total costs involved with this type of system.

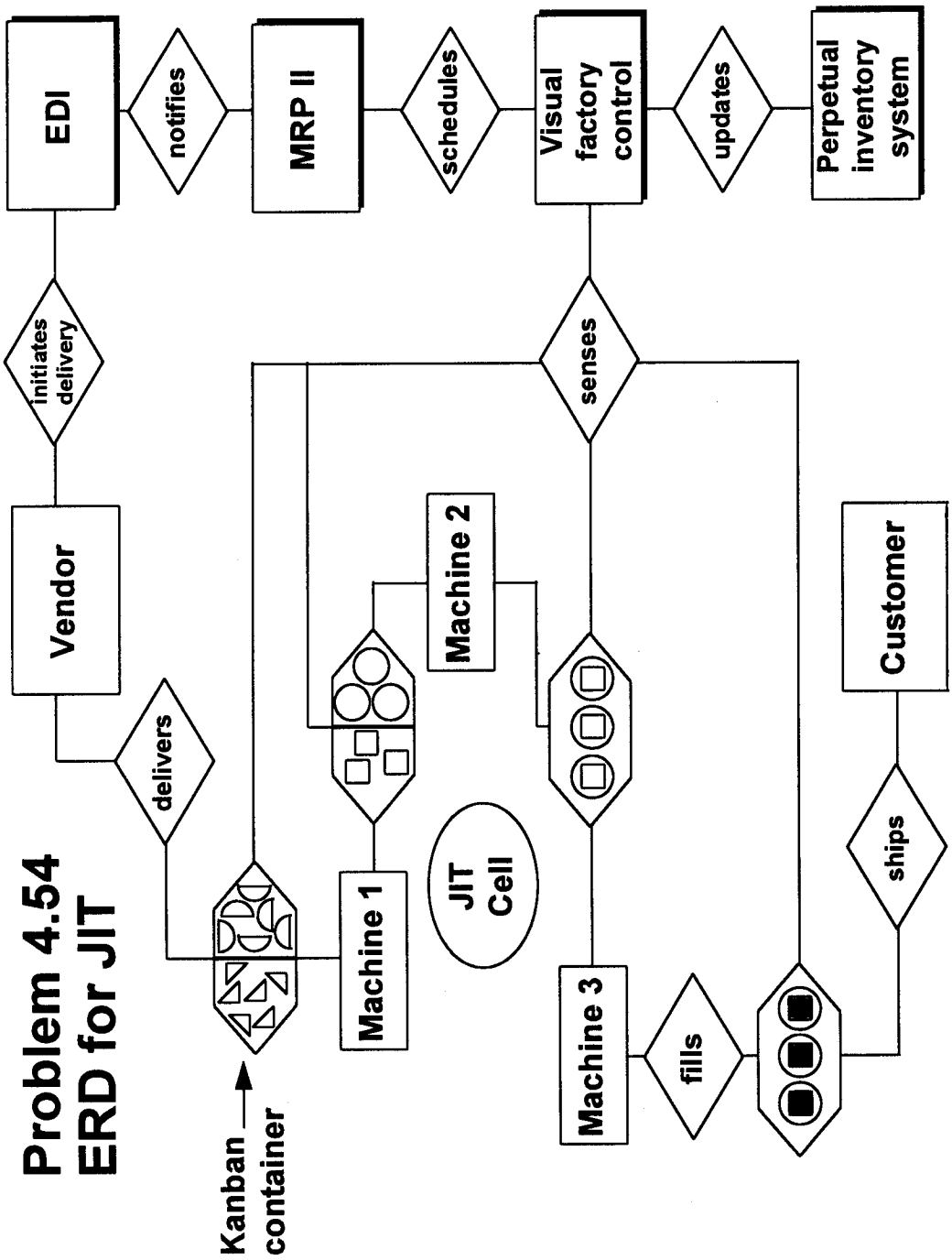
The decision to use a perpetual or periodic inventory system depends on the importance of these factors to the enterprise's management.

JIT manufacturer:

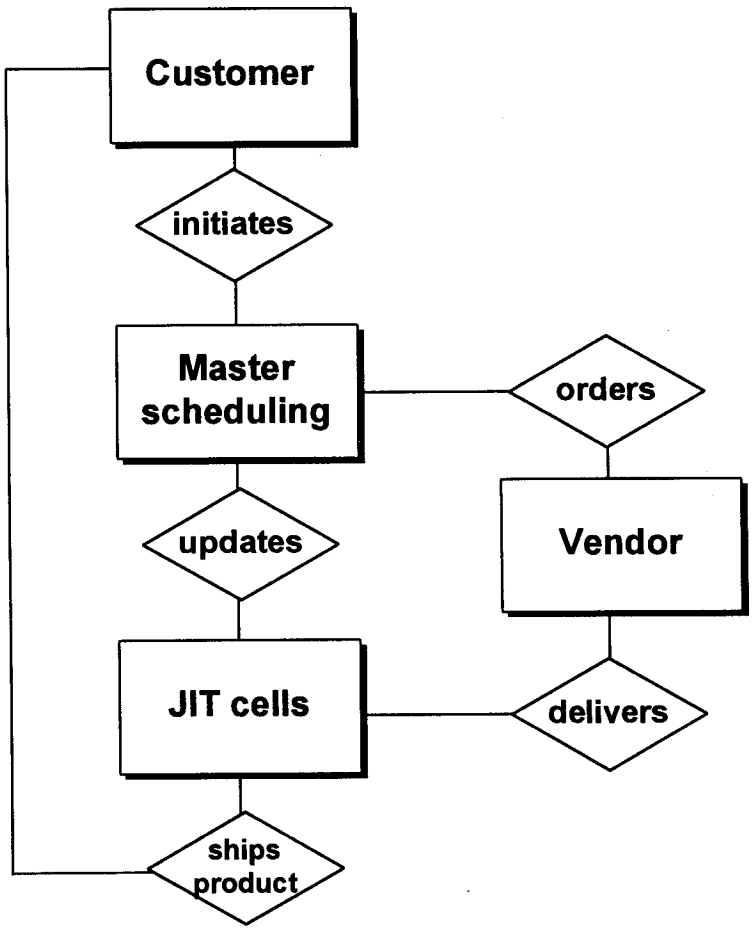
- With a "pure" JIT manufacturing system, no RMI, WIP, or FGI is maintained. Or, these inventories are minimized to the level of the kanban containers. In a pure JIT, no inventory control system may be needed.
- If product sales are highly seasonal, and the enterprise has a world-class commitment to employ workers throughout the year, production kanbans may be based on building FGI during the off-season. In this situation, a perpetual inventory system for FGI may be desirable.
- Another consideration is the level of quality control required because of the nature of the product and production process. This is a consideration in creating a visual factory control system (discussed in Chapter 2).
- Moreover, the number of vendors and customers influences the choice of an inventory system. With a limited number of certified vendors, and few customers, an EDI system can eliminate the need for either a perpetual or periodic inventory system for RMI and FGI.

ERDs for a JIT:

The considerations above lead to two different ERDs for a JIT. The first ERD presented below represents a sophisticated production control system utilizing an EDI system for vendor orders, and a visual factory control system for monitoring kanban containers within and between JIT cells. The second system is very simple and is applicable with a pure JIT in which no inventory control system is needed.


Problem 4.54
ERD for JIT
EDI
notifies
MRP II
schedules
Visual factory control
updates
Perpetual inventory system
initiates delivery
senses
Vendor
delivers
Machine 2
Customer
JIT Cell
Machine 1
Machine 3
fills
ships
Kanban container

Problem 4.54
ERD for JIT



4.55 • Accuracy:
This is a key attribute of any payroll system because of the legal reporting requirements of state and federal governments. From a behavioral and practical perspective, nothing may unmotivate employees more than inaccurate paychecks. Payroll systems were among the first accounting applications to be computerized, highlighting the importance of accuracy. In designing a high quality payroll system, computerization may be essential. This depends upon the number of employees and the complexity of the pay systems and reporting requirements. The importance of these two factors and the need for computerization are highlighted in the Scott Paper Company Insights and Applications vignette within the chapter.

- Relevance:
Relevance relates to the purpose intended. A relevant payroll system should contain the following attributes:
  - Accurate calculations of gross pay, net pay, withholdings, and employer burdens.
  - Generation of reports required by management and governmental agencies.
  - Providing information on the gross and net pay, and withholdings, both for the reporting period and year-to-date, to employees.
  - A high quality payroll system will also provide employees with the total costs of their employment. This includes the employer burden costs associated with each employee. A simple spreadsheet program like the one illustrated in Exhibit 4-10 can serve as a positive motivational device for employees.

- Fairness:
Fairness is impartiality. In calculating the employer burden costs of an employee, some allocations may be necessary. For example, if a university provides separate cafeterias for professors and classified personnel, separate accounting and allocations of these costs would more fairly present this cost. If an enterprise provides certain perquisites to key employees, these costs should not be allocated and included in the burden reported to non-key employees who cannot participate in the perquisites.

- Usability:
This characteristic of high quality information refers to its understandability. Payroll reports should not be so detailed and precise that they are difficult to interpret by those receiving them. Both payroll stub and report designs should present relevant information in a format that is understandable by the users. One way to improve report designs is through an end-user computerized system discussed in Think-Tank Problem 3.25(e).

4.56 *Potential benefits to Glen Abbey from an EDI system:*

- EDI systems reduce the amount of data entry, forms preparation, manual processing, and error correction costs involved in sales of their wines. The primary function of the monastery is not wine production. Nor are monks primarily trained to be effective and efficient businessmen. An EDI's greatest benefits to Glen Abbey may be in the reduction of these activities, and the related frustrations involved in error identification and correction.
- Printed forms costs, mailing costs, and storage and handling costs can be reduced by EDI systems. The cost savings alone from these activities may justify an EDI system, especially if the savings can be used in more important, philanthropic activities.
- An EDI system with its major customer may provide the monks with better information for planning wine production. Much of the information needed in deciding, years in advance, which types of grapes and wines to produce may be currently stored in boxes located in a storeroom or basement. Access to this information may be quite limited. Storing information within the microcomputer, or on floppy disks can provide more effective and accessible information to help the monks make production decisions.
- Their Chicago distributor may, at times, have difficulty in communicating with the monks. An EDI system can promote more effective and efficient communications between the distributor and the monastery.
- An EDI system will provide prompt payment for the wine. Cash flow may be an important consideration for a monastery.

Potential problems with an EDI system:

- With respect to the first benefit cited above, if Glen Abbey has only one major distributor, a computerized EDI system, and its cost, may not be justified. The low speed and small volume of data transmissions may not warrant the investment in EDI equipment.
- Manual errors may not be a problem for monks. They have a tradition of accurate transcription. They may also have a greater motivation for error-free recording than do normal clerical employees within large business enterprises.
- The monks may have the time to prepare and process forms manually. If so, it may be difficult to justify the costs of an EDI system.
- Too much computerization, and the requisite training involved, may not be supported by the monks who have "better things to do."
- Some argue that manual processing allows people to be more in touch with their operations. The monks may want to process all sales information personally.
- EDI may be best suited to industries with regular and repetitious buying, selling and distribution transactions. This may not characterize wine production at Glen Abbey.

4.57 a. Exhibit 4-4 is a spreadsheet program for making basic CAS journal entries. This same program was used for the journal entries in Exhibit 4-11 and in Demonstration Problem 1.

a, b, and c.

Let's Talk

West Publishing has a spreadsheet workbook and templates available for your, and your students, use. If you have specific questions, comments, or suggestions, or we can help in any way, please contact Mike Thomas at (702) 784-6699 (FAX: (702) 784-1769).