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Cost Accounting / محاسبة تكاليف

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Chapter 2
Introduction to Cost Accounting

*** Cost:** resource sacrificed or forgone to achieve specific objective.

*** cost object:** anything for which a separate measurement of cost is needed.

*** Stages of accounting for cost in a costing system:-**

1) Cost accumulation: collection of cost data in some organized means.

2) Cost assignment: designation of cost object to aid in decision making:-

a- Tracing accumulated costs that have direct relationship to cost object.

b- Allocation accumulated costs that have an indirect relationship to cost object.

*** Distinguish between direct and indirect costs:-**

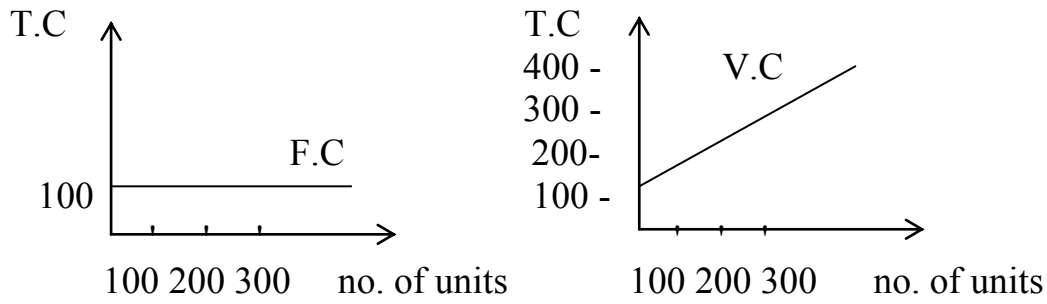
1) Direct cost: feasible to trace to cost object via cost tracing.

2) Indirect cost: related to cost object but not feasible to trace, so it is assigned via cost allocation.

*** Fixed Cost and Variable Cost:-**

1) Fixed Cost: unchanges in total for a given time period despite wide changes in related level of total activity.

2) Variable Cost: changes in total in proportion to changes in related level of total activity.



*** EX.:-** X Company produces type of goods. Assume that fixed cost is $10,000 and variable cost is $10/unit produced.

- Required: 1) find total cost, F.C/unit if the number of units produced is 10,000 units.

2) rework requirement (1), if the number of units produced is 20,000 units.

► Solution:-

1) **T.C** = FC + VC

= $10,000 + ($10 × 10,000) = $110,000

FC/unit = $10,000 ÷ 10,000 = $1/unit

2) **T.C** = FC + VC

= $10,000 + ($10 × 20,000) = $210,000

FC/unit = $10,000 ÷ 20,000 = $0.5/unit

*** In the table below we explain fixed and variable cost:-**

Units produced	VC/unit	Total VC	Total FC	T.C	Unit cost
100,000	$60	$6,000,000	$10,000,000	$16,000,000	$160
200,000	$60	$12,000,000	$10,000,000	$22,000,000	$110
500,000	$60	$30,000,000	$10,000,000	$40,000,000	$80
800,000	$60	$48,000,000	$10,000,000	$58,000,000	$72.5
1,000,000	$60	$60,000,000	$10,000,000	$70,000,000	$70

	T.C	Cost/unit
VC	changes	The same
FC	The same	changes

*** Cost driver:** a variable with cause and effect relationship between change in level of activity and change in level of total cost.

*** Product inventories for manufactured goods:-**

1) Direct Materials (DM): direct materials in stock.

2) Work in Process (WIP): goods partially worked on but not yet fully completed.

3) Finished Goods (FG): goods fully completed but not yet sold.

*** Classification of manufacturing cost:-**

1) Direct materials cost: are the acquisition cost of all materials that eventually become part of cost object (work in process then finished goods) and that **<u>can</u>** be traced to the cost object in feasible way.
EX.: freight-in charges, sales taxes.

2) Direct manufacturing labor cost: the compensation of all manufacturing labor that **<u>can</u>** be traced to the cost object in a feasible way.
EX.: wages.

3) Indirect manufacturing cost: all manufacturing cost that are related to the cost object but that **<u>cannot</u>** be traced to the cost object in a feasible way.
EX.: electric power, cleaning labor.
► this also reffered to as **<u>Manufacturing Overhead Cost (MOH)</u>**.

*** Manufacturing costs:-**

1) Prime cost: all direct manufacturing cost

Prime cost = Direct materials used + Direct labor
(DM) (DL)

2) Conversion cost: all manufacturing cost other than direct materials cost.

Conversion cost = Direct labor + Indirect manufacturing cost
(C.C) (DL) (MOH)

*** EX.:** X Company selected data for the month of Aug. 2004, which are presented below:-

- Direct labor $90,000
- Direct materials purchases $100,000
- Overhead costs $50,000
- Direct materials used $80,000

- Required: 1) Prime cost
2) Conversion cost

► Solution:-

1) Prime cost = DM used + DL
= $80,000 + $90,000 = $170,000

2) C.C = DL + OH
= $90,000 + $50,000 = $140,000

*** Income Statement for service company:-**

Revenues
– Epenses
Net Income

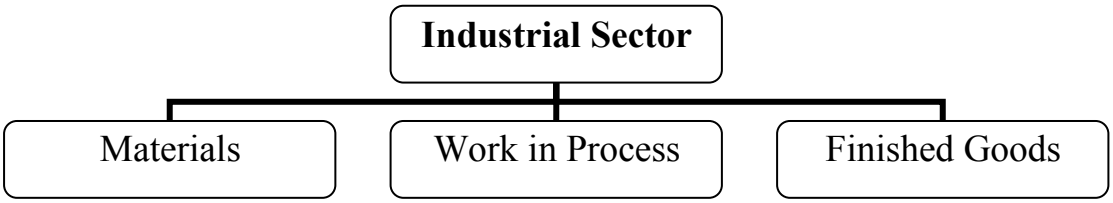
*** Income Statement for Merchandising sector:-**

Revenues
– cost of goods sold (CGS):
Beg. Finished goods
+ C.G. manufactured
C.G. available for sale
– End. Finished goods
(CGS)
Gross margin (gross profit)
+ Other Revenues and gains
– Other Expenses and losses
Net Income

*** Schedule of cost of goods manufactured:-**

Direct materials
Beg. Inventory
+ Purchases of DM
Cost of DM available for use
– End. Inventory
DM used
+ DL
+ MOH:
Indirect manufacturing labor
Heat, light and power
Supplies
Depreciation – Plant building
Depreciation – Plant equipment
Miscellaneous
Total MOH
Add: B.B. WIP
Deduct: E.B. WIP
Cost of goods manufactured

*** Remember:-**



*** EX:** X manufacturing plant select the following data for period from Jan. 1, 2004 to Dec. 31,2004:-

- DM purchased $20,000
- DM inventory 1/1/2004 $10,000
- WIP inventory 1/1/2004 $20,000
- DM inventory 31/12/2004 $5,000
- Direct manufacturing labor (DL) $15,000
- WIP inventory 31/12/2004 $15,000
- Revenues $200,000
- Finished goods inventory 31/12/2004 $15,000
- Indirect manufacturing labor $5,000
- Indirect manufacturing materials $7,000
- Finished goods inventory 1/1/2004 $30,000
- Depreciation – Plant equipment $3,000
- Plant rent $10,000
- Operating expenses $15,000
- **Required: 1)** Prepare an income statement and **2)** supporting schedule of cost of goods manufactured.

► Solution:-

1) Schedule of cost of goods manufactured
For the year ended Dec. 31, 2004

DM:	
B.B. DM	$10,000
+ Purchased of DM	$20,000
– E.B. DM	($5,000)
Cost of DM used	**$25,000**
+ DL	**$15,000**
+ MOH:	
Ind. Labor	$5,000
Ind. Materials	$7,000
Dep. – equip.	$3,000
Plant rent	$10,000
Total MOH	**$25,000**
Total manufacturing cost incurred	$65,000
+ B.B. WIP	$20,000
– E.B. WIP	($15,000)
Cost of finished goods manufactured	$70,000

2) **Income Statement**
For the year ended DEC. 31, 2004

Revenues		**$200,000**
– CGS:		
B.B. FG	$30,000	
+ C. G manufactured	$70,000	
– E.B. FG	($15,000)	
CGS		**($85,000)**
Gross margin		**$115,000**
– Operating Exp.		($15,000)
Net Income		**$100,000**

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Chapter 4
Job Costing

*** There are two basic types of costing system that are used to assign costs to products or services:-**

1) Job costing: we use it to assign distinct units of products or services.

2) Process costing: we use it to assign Masses of identical or similar units of a product or service.
(we will discuss it later in Ch. 3)

*** For any job there is <u>three</u> cost elements:-**

1) Mareial control **2)** Wages control **3)** MOH allocated

*** NOTE:** In each job we **<u>can</u>** trace (determine) DM, DL;
but we **<u>can't</u>** trace MOH; so we use an allocation base such as (machine hours, DL cost, ….etc)

* Explanation of Transactions:-

We next look at a summary of Robinson Company's transactions for February 2008 and the corresponding journal entries for those transactions:-

1) Purchases of materials (direct and indirect) on credit $89,000

Dr. Materials Control	89,000	
Cr. Accounts Payable Control		89,000

2) Usage of direct materials $81,000 and indirect materials $4,000

Dr. WIP Control	81,000	
MOH Control	4,000	
Cr. Mterials Control		85,000

3) Manufacturing payroll for February: direct labor $39,000 and indirect labor $15,000 paid in cash

Dr. WIP Control	39,000	
MOH Control	15,000	
Cr. Cash Control		54,000

4) Other manufacturing overhead costs incurred during February $75,000, consisting of supervision and engineering salaries $44,000 (paid in cash), plant utilities, repairs, and insurance $13,000 (paid in cash), and plant depreciation $18,000

Dr. MOH Control	75,000	
Cr. Cash Control		57,000
Accum. Dep. Control		18,000

5) Allocation of manufacturing overhead to jobs $80,000

Dr. WIP Control	80,000	
Cr. MOH Allocated		80,000

6) Completion and transfer of individual jobs to finished goods $188,800

Dr. Finished Goods Control	188,800	
Cr. WIP Control		188,800

7) Cost of goods sold $180,000

Dr. Cost of goods sold	180,000	
Cr. Finished Goods Control		180,000

8) Marketing costs for February $45,000 and customer service costs for February $15,000 paid in cash

Dr. Marketing Exp.	45,000	
Customer Service Exp.	15,000	
Cr. Cash Control		60,000

9) Sales revenues all on credit $270,000
Dr. Accounts Receivable Control 270,000
Cr. Revenues 270,000

GENERAL LEDGER

(1) Purchase of direct and indirect materials, $89,000

(2) Usage of direct materials, $81,000 , and indirect materials, $4,000

(3) Cash paid for direct manufacturing labor, $39,000 , and indirect manufacturing labor, $15,000

(4) Incurrence of other manufacturing dept. overhead, $75,000

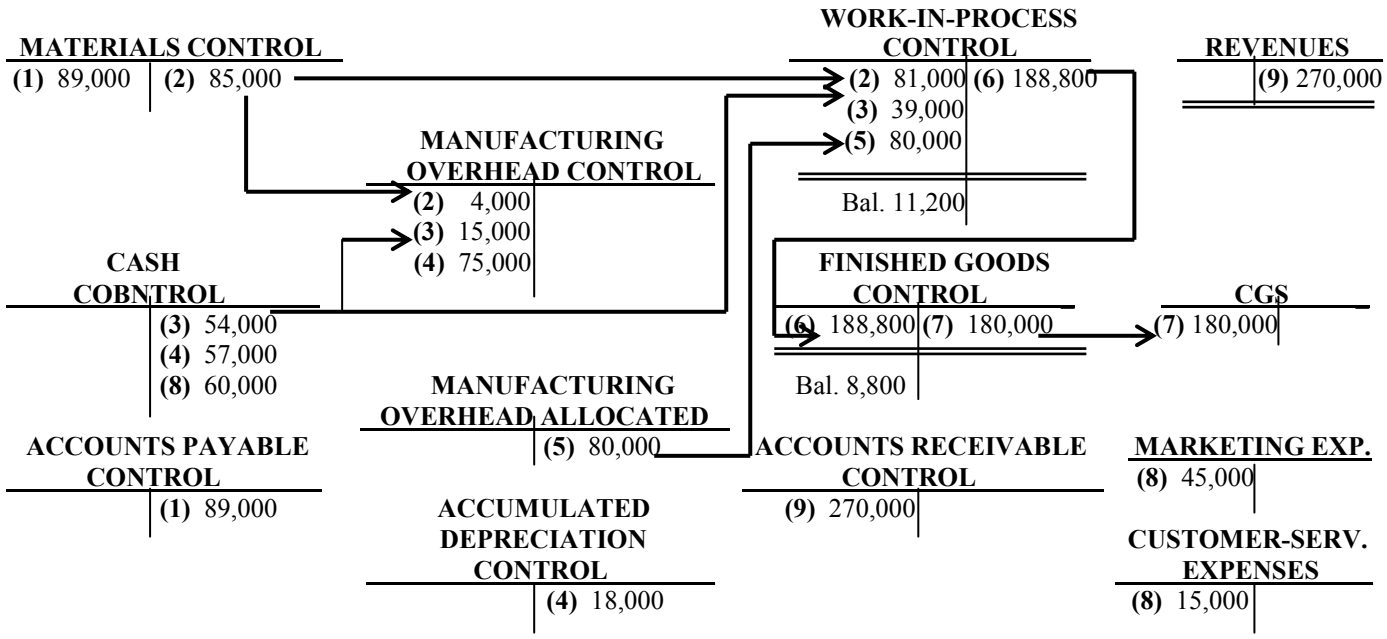
(5) Allocation of manufacturing overhead, $80,000

(6) Completion and transfer to finished goods, $188,800

(7) Cost of goods sold, $180,000

(8) Incurrence of marketing and customer-service costs, $60,000

(9) Sales, $270,000



* The debit balance of $11,200 in the Work-in-Process Control account represents the total cost of all jobs that have not been completed as of the end of February 2008.

* The debit balance of $8,800 in the Finished Goods Control account represents the cost of all jobs that have been completed but not sold as of the end of February 2008.

*** EX:** A&O Company has made the following operations during Dec. 2004:-

1- the purchased materials were $89,000.
2- $81,000 of DM were sent to WIP.
3- $4,000 of Ind.M wre used.
4- DL costs $39,000.
5- Ind.L costs $15,000.
6- Other MOH used in WIP operation were $80,000.
7- Costs of completed units in WIP and transferred to FG $188,000.
8- CGS were $180,000.
- **Required:** Prepare the journal entries during Dec.

► Solution:-

1- Dr. Mareials control	89,000		
Cr. Cash		89,000	
2- Dr. WIP	81,000		
Cr. Mareials control		81,00(	Material used
3- Dr. MOH	4,000		
Cr. Materials control		4,000	
4- Dr. WIP	39,000		
Cr. Wages control		39,000	Direct manuf. labor
5- Dr. MOH	15,000		
Cr. Wages control		15,000	
6- Dr. WIP	80,000		
Cr. MOH allocated		80,000	
7- Dr. FG	188,000		
Cr. WIP		188,000	
8- Dr. CGS	180,000		
Cr. FG		180,000	

*** Job costing system in Manufacturing companies:-**

Job Costing

Actual costing | Normal costing

1) Actual Costing: a costing method that traces Direct costs and allocates Indirect costs to a cost object.

➡ **Computations:-**

a- DM = Actual price / unit × No. of units used

b- DL = Actual rate / DL hour × No. of DL hours

c- MOH = Actual rate / allocation base × Actual quantity of the allocation base

*** Actual rate per allocation base =** Total actual Ind. Cost / Total actual quantity of allocation base

*** NOTE:-** In this approach, we must wait to the of the financial period to konow the actual MOH costs.

2) Normal Costing: a costing method that depends on budgeted allocation base.

➡ **Computations:-**

a- DM and **DL** computed in the same way as in **Actual Costing**.

b- MOH = Budgeted rate / allocation base × Actual quantity of the all base

c- Budgeted rate per allocation base = Total budgeted Ind. Cost / Total budgeted quantity of all base

*** EX:** A&O Company uses a job costing system that has two jobs (A and B) its job costing has two direct cost (DM, DL) the MOH is allocated using machine hour (allocation base) The budgeted rate for the company is:-

	Job A	**Job B**
DM	$30 / pound	$20 / pound
DL	$10 / DLH	$8 / DLH

- Total budgeted MOH cost is $10,000
- Total budgeted machine hours is 2,000 hours
- The actual rates:-

	Job A	**Job B**
DM	$25 / pound	$22 / pound
DL	$12 / DLH	$7 / DLH

- Indirect cost $6 / machine hour
- The actual quantity used is:-

	Job A	**Job B**
DM	1,000 pound	1,500 pound
DL	100 hour	90 hour
machine hour	200 hour	300 hour

- Required: Complete the total cost of each job using **1) Actual** and **2) Normal** costing.

► Solution:-

1) Normal costing:-

- Job A:-

- DM = $25 × 1,000 = $25,000
- DL = $12 × 100 = $1,200
- Budgeted rate per all. base = $\frac{\$10,000}{2,000}$ = $5 / MH
- MOH allocated = $5 × 200 = $1,000
- Total cost of Job A = $25,000 + $1,200 + $1,000 = **$27,200**

- Job B:-

- DM = $22 × 1,500 = $33,000
- DL = $7 × 90 = $630
- Budgeted rate per all. base = $\frac{\$10,000}{2,000}$ = $5 / MH
- MOH allocated = $5 × 300 = $1,500
- Total cost of Job B = $33,000 + $630 + $1,500 = **$35,130**

2) Actual Costing:-

- Job A:-

- DM = $25 × 1,000 = $25,000
- DL = $12 × 100 = $1,200
- MOH allocated = $6 × 300 = $1,200
- Total cost of Job A = $25,000 + $$1,200 + $1,200 = **$27,400**

- Job B:-

- DM = $22 × 1,500 = $33,000
- DL = $7 × 90 = $630
- MOH allocated = $6 × 300 = $1,800
- Total cost of Job B = $33,000 + $630 + $1,800 = **$35,430**

*** The treatment of under or over MOH allocated:-**

1) MOH allocated **>** actual MOH (over allocated)

2) MOH allocated **<** actual MOH (under allocated)

*** There are <u>three</u> main approaches to adjust the differences:-**

1) Write – off to CGS.

2) Proration based on Ending Balance (WIP, FG, CGS).

3) Proration based on the amount of MOH allocated in the Ending Balance (WIP, FG, CGS).

1) Write – off to CGS:-

➡ The total under or over allocated MOH is included in this year's CGS.

*** EX:** If the MOH allocated was $1,000,000 and the Actual MOH was **$**1,200,000

- Required: adjust the difference.

► **Solution:-** closing entry

- **Dr.** MOH allocated 1,000,000
  CGS 200,000 ⟶ the difference (under)
  Cr. MOH 1,200,000

*** NOTE:-**

- Normal Balance MOH allocated (**Cr.**).
- Normal Balance actual MOH (**Dr.**).
- The difference between them recorded as CGS.

*** In case of over allocated the entry will be as follow:-**

- Dr. MOH allocated
  Cr. CGS
  MOH

2) Proration based on Ending Balance of (WIP, FG, CGS):-

➡ Spread under or over allocated MOH among the Ending Balance for (WIP, FG, CGS).

*** EX:** If MOH allocated $1,000,000 and actual MOH $1,200,000 and the Ending Balance were as follows:-
WIP ($50,000), FG ($75,000), CGS ($2,375,000)

- Required:adjust the difference.

► **Solution:-**

Accounts	E.B.	Rate	Proration
WIP	$50,000	2%	$4,000
FG	$75,000	3%	$6,000
CGS	$2,375,000	95%	$190,000
Total	**$2,500,000**	**100%**	**$200,000**

- **Dr.** MOH allocated 1,000,000
  WIP 4,000
  FG 6,000
  CGS 190,000
  Cr. MOH 1,200,000

*** In case of over allocated the entry will be as follow:-**

- **Dr.** MOH allocated
  Cr. WIP
  FG
  CGS
  MOH

3) Proration based on the amount of MOH allocated in the E.B. of (WIP, FG, CGS):-

➡ Spread under or over allocated MOH among the amount of MOH in (WIP, FG, CGS) Ending Balances.

*** EX:** If MOH allocated was $1,000,000 and actual MOH was $1,200,000 and the amount of MOH in the E.Bs of WIP is ($13,000), FG is ($25,000), CGS is ($962,000).

- **Required:** adjust the difference.

► **Solution:-**

Accounts	MOH allocated	Rate	Proration
WIP	$13,000	1.3%	$2,600
FG	$25,000	2.5%	$5,000
CGS	$962,000	96.5%	$192,400
Total	**$1,000,000**	**100%**	**$200,000**

- **Dr.** MOH allocated 1,000,000
  WIP 2,600
  FG 5,000
  CGS 192,000
  Cr. MOH 1,200,000

*** In Case of over allocated the entry will be as follow:-**

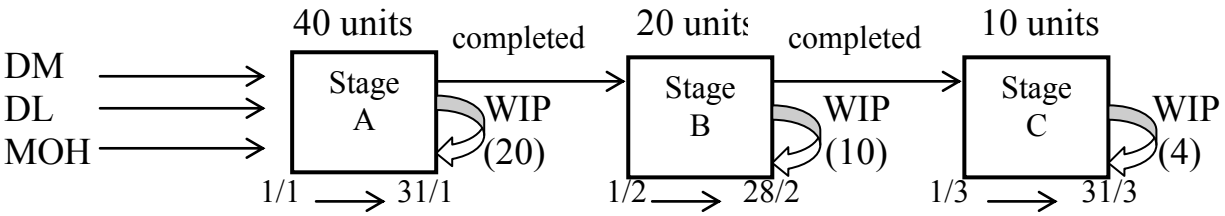
- **Dr.** MOH allocated
  Cr. WIP
  FG
  CGS
  MOH

3

Chapter 17
Process Costing

*** Process costing system:** a costing system in which the cost object is masses of identical or similar units of a product or service.

*** We have <u>two</u> items for process costing:-**
1) Direct material (DM).
2) Conversion Cost (C.C).



*** NOTE:-**
1) The E.B. WIP for any stage represents the B.B. WIP for the same stage in the next period.
2) We must separate the financial periods for all stages.

*** Process Costing System Steps:-**
Step 1) Summarize the flow of physical units of output.
Step 2) Compute output in terms of equivalent units.
Step 3) Compute equivalent units costs.
Step 4) Summarize total costs to account for.
Step 5) Assign total costs to units completed and to units in E.B. WIP.

*** EX:** A&O Company has <u>two</u> departments, Mixing dep. and Refining dep., its process costing system in the Mixing dep. has single DM and one C.C pool

- The following data for Mixing dep:-

Units		**Costs**	
B.B. WIP	0	DM	300,000
Units started	50,000	C.C	100,000
Completed & transferred	30,000		

C.C added evenly during the period, and DM added at a completion degree of 60%, (that means when the units reach a completion degree of 60% from C.C we add all the DM), the completion degree of C.C for E.B. WIP is 70%.

- Required: Implement the **<u>five</u>** steps of Process Costing system.

► Solution:-

Step 1) Summarizing physical units flow:-

(0) B.B. WIP _____ completed (30,000)

Started & completed (30,000)

(50,000) started _____ E.B. WIP (20,000)

*** NOTES:-**

1) B.B. WIP + started & completed = completed units + E.B. WIP

0 + 50,000 = 30,000 + 20,000

2) Completed units represents started units for the next stage.

Step 2) Computing output in terms of equivalent units:-

	Total	**DM**	**C.C**
Completed units	30,000	30,000	30,000
E.B. WIP	20,000	20,000	14,000
No. of equiv. units	**50,000**	**50,000**	**44,000**

Step 3) Computing equiv. unit costs:-

Costs	**Total**	**DM**	**C.C**
B.B. WIP	0	0	0
Current period cost	$400,000	$300,000	$100,000
Cost / equiv. unit	**$8.27**	**$6**	**$2.27**
		[$300,000 / 50,000]	[$100,000 / 44,000]

Step 4) Summarizing tatal costs to account for:-

Total cost to account for = $300,000 + $100,000 = **$400,000**

Step 5) Assign tatal costs:-
1) completed units = 30,000 × $8.27 = **$248,181.8**
or:- DM ⟶ 30,000 × $6 = $180,000
C.C ⟶ 30,000 × $2.27 = $68,181.8 } **$248,181.8**

2) E.B. WIP:-
DM = 20,000 × $6 = $120,000
C.C = 14,000 × $2.27 = $31,818.2 } **$151,818.2**

Total cost accounted for = $248,181.8 + $151,818.2 = **$400,000**

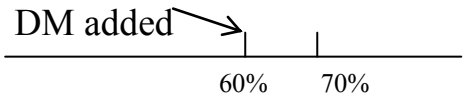
3) started & completed units = completed units – B.B. WIP
= 30,000 – 0 = **30,000**

or:- started & completed units = started units – E.B. WIP
= 50,000 – 20,000 = **30,000**

Step 2) computing output in terms of equiv. units:-

completed units 30,000 → 100% from DM 30,000
→ 100% from C.C 30,000

E.B. WIP 20,000 → 100% from DM 20,000
→ 70% from C.C 14,000



IF
the completion degree of C.C of E.B. WIP ≥ DM added at a completion degree
Then
we aadd all DM (100% of DM)
Else
zero% are added of DM

* Cost Report:-

flow of production	(Step 1) Physical units Total	(Step 2) Equiv. units DM	C.C
B.B. WIP	0		
started units	50,000		
units to account for	50,000		
completed & transferred	30,000	30,000	30,000
E.B. WIP	20,000	20,000	14,000
units accounted for	50,000	50,000	44,000

flow of production	Total	DM	C.C
(Step 3) B.B. WIP	0	0	0
cost added in current period	400,000	300,000	100,000
cost incurred to date		300,000	100,000
Divided by equiv. units of work done to date		÷50,000	÷44,000
cost / equiv. unit	8.27	6	2.27
(Step 4) Total cost to account for	400,000		
(Step5)Assignment of costs:-			
completed & transferred	248,181.8	180,000	68,181.8
E.B. WIP	151,818.2	120,000	31,818.2
Total cost accounted for	400,000	400,000	100,000

* Process Costing Methods:-

1) weighted average.
2) First in, First out **(FIFO).**

*** EX:-** A&O Company has <u>two</u> departments Mixing and Cooking dep. its Process Costing System in the Mixing dep. has <u>two</u> DM cost categories (Z & X) and one C.C pool.

B.B. WIP 15,000 , completion degree 40%
units started 45,000
E.B. WIP 20,000 , completion degree 55%

* C.C is added evenly during the period.
* DM (Z) is added at a completion degree of 60%.
* The completion degree of DM (X) is 70%.
* The cost of B.B. is 100,000 include:-

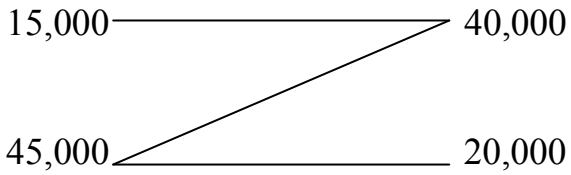
DM, Z = 15,000 C.C = 60,000
X = 25,000

* The current period cost:-

DM, Z = 125,000 C.C = 200,000
X = 175,000

- Required:- Prepare a cost report using the **<u>two</u>** <u>methods</u>.

► Solution:-



1) weighted average method:-

*** Cost Report:-**

cost flow	Total	DM Z	DM X	C.C
B.B. WIP	15,000			
started units	45,000			
units to account for	60,000			
completed units	40,000	40,000	40,000	40,000
E.B. WIP	20,000	0 **a**	14,000 **b**	11,000 **c**
No. of equiv. units	60,000	40,000	54,000	51,000
Costs:-				
B.B. WIP	$100,000	$15,000	$25,000	$60,000
current period cost	$500,000	$125,000	$175,000	$200,000
Total cost	$600,000	$140,000	$200,000	$260,000
cost / equiv. =	$123	$3.5	$3.7	$5.1
Assignment of costs:-				
completed	$492,000	$140,000 **d**	$148,000 **e**	$204,000 **f**
E.B. WIP	$107,900	$0 **g**	$51,800 **h**	$56,000 **i**
Total cost accounted for =	$599,900	$140,000	$199,800	$260,100

a = 20,000 × 0% = 0 (**DM added at completion degree > completion degree E.B. WIP**)
b = 20,000 × 70% = 14,000
c = 20,000 × 55% = 11,000
d = $3.5 × 40,000 = $140,000
e = $3.7 × 40,000 = $148,000
f = $5.1 × 40,000 = $204,000
g = $3.5 × 0 = $0
h = $3.7 × 14,000 = $51,800
i = $5.1 × 11,000 = $56,100

2) FIFO method:-

In this method completed units is divided into → B.B. WIP
started & completed

*** Cost Report:-**

cost flow	Total	DM Z	DM X	C.C
B.B. WIP	15,000			
started units	45,000			
units to account for	60,000			
B.B. WIP	15,000	151,000 **a**	4,500 **b**	9,000 **c**
started & completed	25,000	25,000	25,000	25,000
E.B. WIP	20,000	0	14,000	11,000
no. of equiv. units	60,000	40,000	43,000	45,000
Costs:-				
B.B. WIP	$100,000	— **d**	—	—
current period cost	$500,000	$125,000	$175,000	$200,000
Total cost	$600,000	$125,000	175,000	$200,000
Cost / equiv. =	$11.588	$3.125	$4.023	$4.44
Assignment of costs:-				
B.B. WIP	$204,939 **e**	$46,875	$18,104	$39,960
started & completed	$289,700	$78,125	$100,575	$111,000
E.B. WIP	$105,162	0	$56,322	$48,840
Total cost accounted for =	$599,801	$125,000	$175,001	$199,880

a = 15,000 × 100% = 15,000

(إذا كان مستوى إضافةالمواد أعلى من مستوى إتمام B.B. WIP فسوف نضيف ال DM لها في الفترة الحالية؛ أما إذا كان أقل فتكون الDM قد أضيفت في فترة سابقة)

b = 15,000 × (100% - 70%) = 4,500

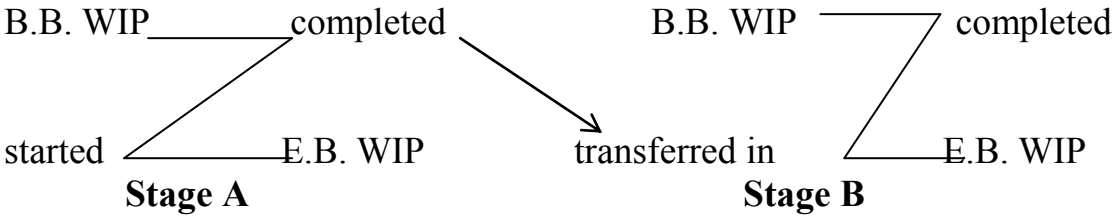
c = 15,000 × (100% - 40%) = 9,000

d = (هنا لم نضع شيئاً لأننا حملناها في الفترة السابقة)

e = $100,000 + $46,875 + $18,104 + $39,960 = $204,939

* Transferred in Costs:-

Costs incurred in previous departments that carried forward as the product's costs when it mores to a subsequent process.



*** NOTE:-**

- Transferred in units (costs) treated as materials added at the beginning of the operation (at a completion degree of 0%).

*** EX:-** In the previous example assume that the process costing system in the Cooking dep. (Stage 2) has one DM cost category, and one C.C pool, the following data for Cooking dep.:-

* completion degree og B.B. WIP $22,000 include:-
  transferred in cost = $11,000
  DM cost = $3,000
  C.C = $8,000

*The current period cost:-

DM = $4,000 , C.C = $20,000

- Required:- Prepare cost report using the **two** methods.

► **Solution:-**

1) weighted average method:-

*** Cost Report:-**

Cost flow		Total	Transferred in costs	DM	C.C
B.B. WIP		3,000			
transferred in units P.22		40,000			
units to account for		43,000			
completed units		20,000	20,000	20,000	20,000
E.. WIP		23,000	23,000	0	9,200
no. of equiv. units		43,000	43,000	20,0000	29,200
Costs:-					
B.B. WIP		$22,000	$11,000	$3,000	$8,000
Current period cost		$516,000	$492,000 **a**	$4,000	$20,000
Total cost		$538,000	$503,000	$7,000	$28,000
Cost / equiv.	=	$13.01	$11.7	$0.35	$0.96
Assignment of costs:-					
Completed units		$260,200	$234,000	$7,000	$19,200
E.B. WIP		$277,932	$264,100	$0	$8,832

a = the cost of completed units from the previous stage (Mixing dep.).

2) FIFO method:-

*** Cost Report:-**

Cost flow	Total	Transferred in costs	DM	C.C
B.B. WIP	3,000			
transferred in units	40,000			
units to account for	43,000			
B.B. WIP	3,000	**— a**	—	750 **b**
started & completed	17,000	17,000	17,000	17,000
E.B. WIP	23,000	23,000	0	9,200
no. of equiv.	43,000	40,000	17,000	26,950
Costs:-				
B.B. WIP	$22,000	—	—	—
Current period cost	$516,000	$492,000	$4,000	$20,000
Total cost	$538,000	$492,000	$4,000	$20,000
cost / equiv. =	$11.705	$10.725	$0.24	$0.74
Assignment of costs:-				
B.B. WIP	$22,555 **c**	—	—	$555
started & completed	$198,985	$182,325	$4,080	$12,580
E.B. WIP	$253,483	$246,675	$0	$6,808

a ⟶ (أخذت المواد في الفترة السابقة عند مستوى إتمام 0% أي في بداية التشغيل)

b = 3,000 × 25% = 750

c = $22,000 + $555 = $22,555
(B.B. WIP)

weighted average method

DM

added at the beginning of the process:-
- B.B. WIP no. of units×100%
- started & completed no. of units×100%
- E.B. WIP no. of units×100%

} always 100%

added evenly throughout the process:-
- B.B. WIP no. of units×100%
- started & completed no. of units×100%
- E.B. WIP no. of units×(percentage of completion)

*** C.C**

*** C.C:-**
- C.C by their nature are added evenly throughout the process.
- The treatment of all populations (B.B. WIP, started & completed, E.B. WIP) is thus the same as that for DM add throughout.

*** Cost / equiv.** = $\frac{\text{cost of B.B. WIP + cost added during period}}{\text{no. of equiv. units}}$ } uses for DM and C.C

FIFO method

DM

added at the beginning of the process:-
- B.B. WIP no. of units×ø
- started & completed no. of units×100%
- E.B. WIP no. of units×100%

added throughout the process:-
- B.B. WIP no. of units×(1-percentage of completion)
- started & completed no. of units×100%
- E.B. WIP no. of units×(percentage of completion)

نفس النسبة المعطاة في السؤال

*** C.C**

*** C.C:-**
- The same as this paragraph

*** Cost / equiv.** = $\frac{\text{cost added during the period}}{\text{no. of equiv. units}}$ } uses for DM and C.C

4

Chapter 15
Allocation of Support Department Costs

* **Cost allocation:** The assignment of Ind. costs to a particular cost object by using allocation base.

* **Allocation base:** A factor that links in a systematic way an Ind. cost or group of Ind. costs to a cost object.

*** Single rate and Dual rate:-**
a) Single rate: are rate for allocating costs in a cost pool.
b) Dual rate: **two** rates for allocating costs in a cost pool; one for Variable Costs and the other for Fixed Costs.

* **EX:-** M-Company has designed and build a power plant to serve three factories. The table below shows the budgeted and the actual usage of the Kilowats of this year:-

Factory	Budgeted	Actual
A	100,000 KW	80,000 KW
B	60,000 KW	120,000 KW
C	40,00 KW	40,000 KW
Total	200,000 KW	240,000 KW

- The actual Fixed Cost of the power plant $1,000,000
- The actual Variable Cost of the power plant $2,000,000
- **Required:-** Find Single and Dual rate.

► Solution:-
* Toatal cost = Fixed Cost + Variable Cost
= $1,000,000 + $2,000,000 = $3,000,000

a) Single rate:-
a-1) (allocation based on budgeted usage):-
single rate and budgeted usage = $\frac{\text{T.C}}{\text{Total budg. usage}} = \frac{\$3,000,000}{200,000\ \text{KW}} = \$15/\text{KW}$

A = $15 × 100,000 KW = $1,500,000
B = $15 × 60,000 KW = $900,000
C = $15 × 40,000 KW = $600,000
$3,000,000

a-2) (allocation based on actual usage):-

single rate and actual usage = $\frac{\text{T.C}}{\text{Total actual usage}} = \frac{\$3{,}000{,}000}{240{,}000\ \text{KW}} = \$12.5/\text{KW}$

A = \$12.5 × 80,000 KW = \$1,000,000
B = \$12.5 × 120,000 KW = \$1,500,000
C = \$12.5 × 40,000 KW = \$500,000
\$3,000,000

b) Dual rate:-

b-1) (allocation based on budgeted usage):-

* Dual rate and budgeted usage:-

- Fixed Cost rate = $\frac{\text{Fixed Cost}}{\text{Total budg. usage}} = \frac{\$1{,}000{,}000}{200{,}000\ \text{KW}} = \$5 / \text{KW}$

- Variable Cost rate = $\frac{\text{Variable Cost}}{\text{Total budg. usage}} = \frac{\$2{,}000{,}000}{200{,}000\ \text{KW}} = \$10 / \text{KW}$

Factory		**rate**		**budg. usage**	
A:-	Fixed Cost =	\$5	×	100,000 KW =	\$500,000
	Variable Cost =	\$10	×	100,000 KW =	\$1,000,000
					\$1,500,000
B:-	Fixed Cost =	\$5	×	60,000 KW =	\$300,000
	Variable Cost =	\$10	×	60,000 KW =	\$600,000
					\$900,000
C:-	Fixed Cost =	\$5	×	40,000 KW =	\$200,000
	Variable Cost =	\$10	×	40,000 KW =	\$400,000
					\$600,000

b-2) (allocation based on actual usage):-

* Dual rate and actual usage:-

- Fixed Cost rate = $\frac{\text{Fixed Cost}}{\text{Total actual usage}} = \frac{\$1{,}000{,}000}{240{,}000\ \text{KW}} = \$4.16 / \text{KW}$

- Variable Cost rate = $\frac{\text{Variable Cost}}{\text{Total actual usage}} = \frac{\$2{,}000{,}000}{240{,}000\ \text{KW}} = \$8.3 / \text{KW}$

Factory		rate		budg. usage	
A:-	Fixed Cost =	$4.16	×	80,000 KW =	$332,800
	Variable Cost =	$8.3	×	80,000 KW =	$664,000
					$996,000
B:-	Fixed Cost =	$4.16	×	120,000 KW =	$499,000
	Variable Cost =	$8.3	×	120,000 KW =	$996,000
					$1,495,200
C:-	Fixed Cost =	$4.16	×	40,000 KW =	$166,400
	Variable Cost =	$8.3	×	40,000 KW =	$332,000
					$498,400

***** As we see we have the same results in **(a-1)** and **(b-1)**, so what is the benefit of the cost separation in Dual rate?

► Answer:-

- An important benefit of the Dual rate method is that it signals to division managers how Variable Costs and Fixed Costs behave differently. This important information could steer division managers into making decisions that benefit the corporation as well as each division.

For example, if we bought power from other company and the Variable rate was $8 / KW, that will be better for the company to minimize the cost, so the cost rate will be:-

$5 (Fixed Cost rate) + $8 (Variable Cost rate) = $13

If we bought power from outside.

* Allocation cost of Support Departments:-

*** Departments types:-**

1) Operating dep.: also called **Production dep.** in manufacturing companies; directly adds value to a product or service.

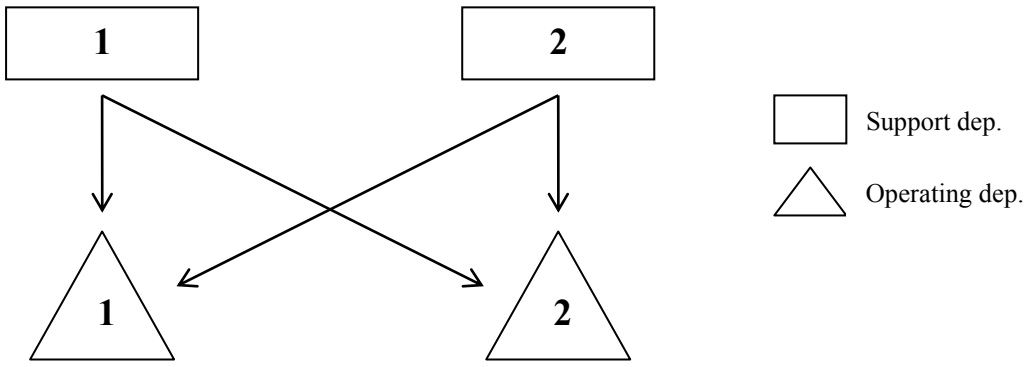
2) Support dep.: also called **Service dep.** provides services that assist other internal dep. (Operating, Support) in the company, such as: (power plant, and Maintenance dep.).

*** The <u>three</u> methods of allocating costs:-**

1) Direct method.
2) Step down method.
3) Reciprocal allocation method.

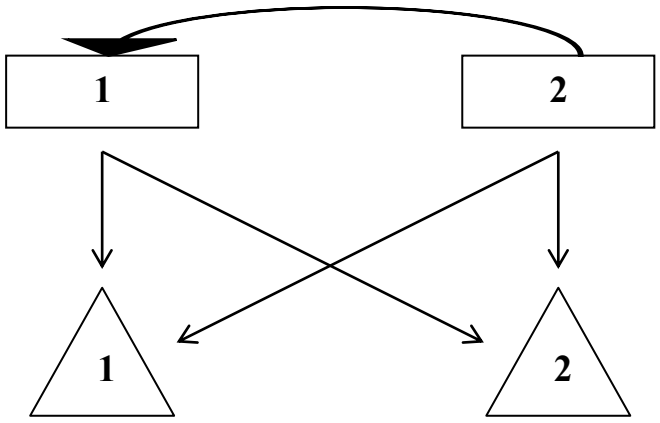
<u>1) Direct method:-</u>

- We allocate the cost of each Support dep. to the Operating dep. and we ignore other Support deps.



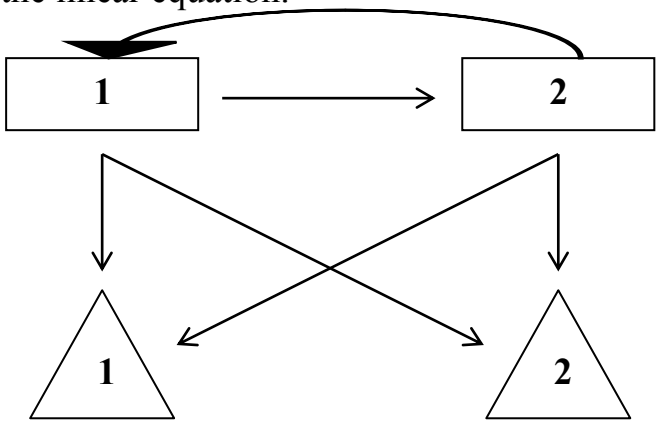
<u>2) Step down method:-</u>

- We compare between the Support deps. to see which are gives the most service to other Support deps. Then we allocate it first and we ignore all other Support deps. That gives less services.



3) Reciprocal allocation method:-

- We allocate the cost through cross relationship between the Support dep. by using the linear equation.



*** EX:-** A&O Company has **two** Service deps. and **two** Assembly deps. the company uses a Single rate method to allocate the cost of each dep.

Service Dep.	**Assembly Dep.**
$600,000 – Engineering dep.	$400,000 – Home Security Sys.
$116,000 – Information Sys. Support	$200,000 – Business Security Sys.

* Service dep. provide the following services:-

	used by				
	Support dep.		Operation dep.		
Supplied by	Engineering Support	Information Sys. Support	Home Security Sys.	Business Security Sys.	Total
Engineering	—	20%	30%	50%	100%
Information Sys.	10%	—	80%	10%	100%

- Required:-

1) allocate the service dep. cost to the Assembly dep. using:-

a- Direct method.

b- Step down method.

c- Reciprocal allocation method**.**

2) Find the total cost of the Assembly dep. in each allocation method.

► **Solution:-**

1-a) Direct method:-

- allocating Eng. dep. cost to the Assembly dep.:-

for H.S.S ⟶ 30%/80% × $600,000 = $225,000

for B.S.S. ⟶ 50%/80% × $ 600,000 = $375,000

- allocating I.S.S. dep. cost to the Assembly dep.:-

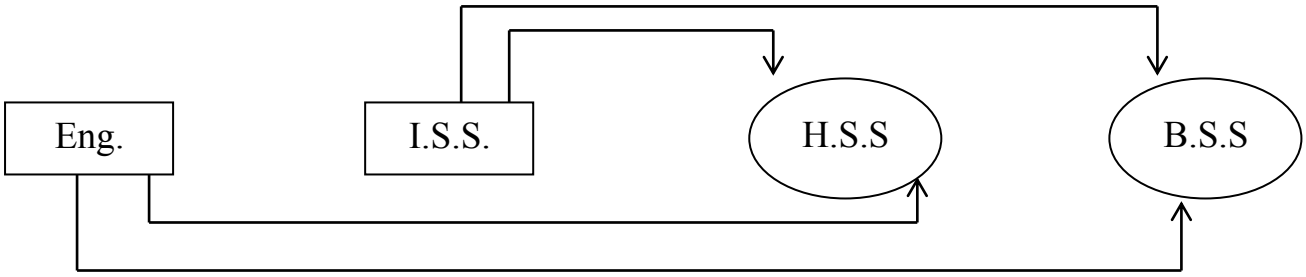
for H.S.S. ⟶ 80%/90% × $116,000 = $103,111

for B.S.S. ⟶ 10%/90% × $116,000 = $12,889

2) Assembly costs:-

H.S.S. = $400,000 + $225,000 + $103,111 = $728,111

B.S.S. = $200,000 + $375,000 + $12,889 = $ 587,889



* The cost of the Support deps. after allocation = 0

1-b) Step down method:-

- In this example we see that Eng. dep. gives more service, so we allocate its cost first.

- Eng. dep. gives I.S.S. 20% (first to allocate)

- I.S.S. dep. gives Eng. 10%

- allocating Eng. dep. cost the other service of Assembly deps.:-

for I.S.S. ⟶ 20%/100% × $600,000 = $120,000

for H.S.S. ⟶ 30%/100% × $600,000 = $180,000

for B.S.S. ⟶ 50%/100% × $600,000 = $300,000

- allocating I.S.S. cost to the Assembly dep.:-

for H.S.S. $\longrightarrow \frac{80\%}{90\%} \times \$236,000 = \$209,778$

For B.S.S. $\longrightarrow \frac{10\%}{90\%} \times \$236,000 = \$26,222$

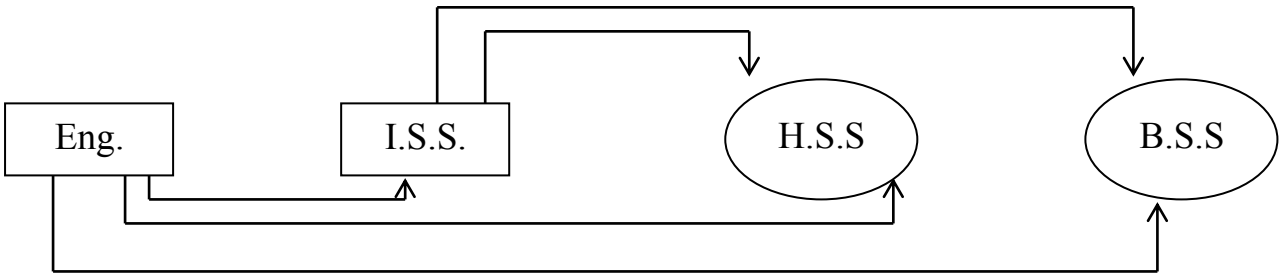
*** NOTE:-**

- Total I.S.S. cost = \$116,000 + \$120,000 = **\$236,000**
  → the cost that will be allocated

2) Assembly costs:-

H.S.S. = \$400,000 + \$180,000 + \$209,778 = \$789,778

B.S.S. = \$200,000 + \$300,000 + \$26,222 = \$526,222



1-c) Reciprocal allocation method:-

Eng. dep. cost = \$600,000 + 10% of I.S.S. cost ——(1)

I.S.S. cost = \$116,000 + 20% of Eng. dep. cost ——(2)

* Solving the **two** linear equations:-

Eng. cost = \$600,000 + 10% (\$116,000 + 20% Eng. cost)

= \$600,000 + \$11,600 + 2% Eng. cost

100% Eng. cost = \$611,600 + 2% Eng.cost

98% Eng. cost = \$611,600

Eng. cost = $\frac{\$611,600}{98\%}$ = \$624,081.6

I.S.S. cost = \$116,000 + 20% Eng. cost

= \$116,000 + 20% × \$624,081.6 = \$240,816.3

- allocating Eng. cost to I.S.S. , H.S.S. , B.S.S. :-

for I.S.S. ——→ 20% × \$624,081.6 = \$124,816.4

for H.S.S. ——→ 30% × \$624,081.6 = \$187,224.6

for B.S.S. ——→ 50% × \$624,081.6 = \$312,041

- allocating I.S.S. cost to Eng. dep. , H.S.S. , B.S.S. :-

for Eng. dep. ⟶ 10% × $240,816.3 = $24,082

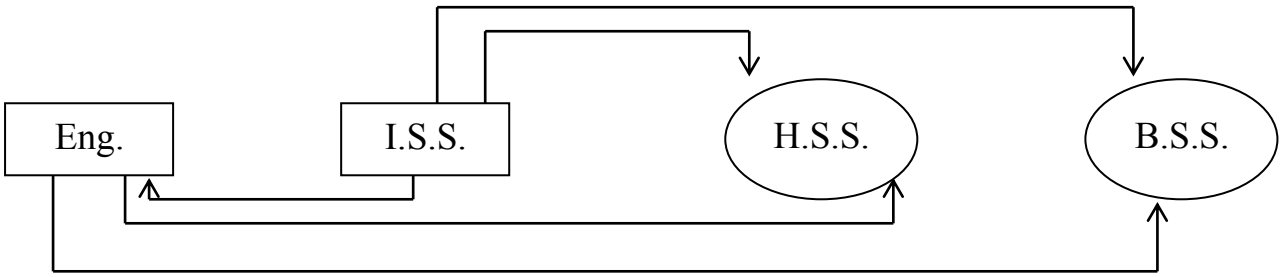
for H.S.S. ⟶ 80% × $240,816.3 = $192,653.04

for B.S.S. ⟶ 10% × $240,816.3 = $24,082

2) Assembly costs:-

H.S.S. = $400,000 + $187,224.6 + $192,653.04 = $779,877.64

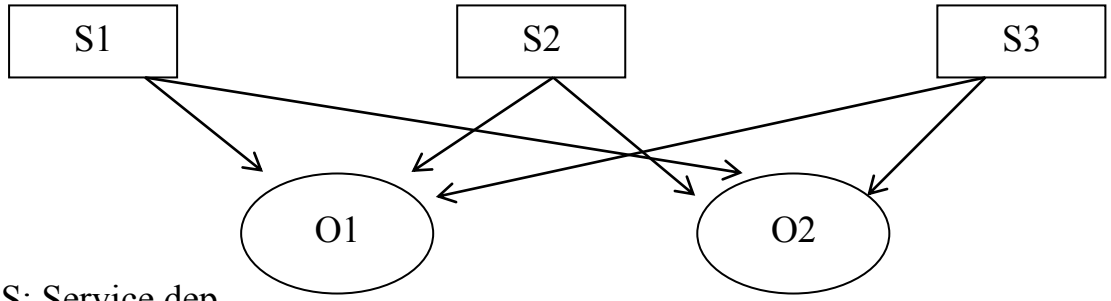
B.S.S. = $200,000 + $312,041 + $24,082 = $536,123



* The cost of Eng. dep and I.S.S. after allocation = 0

* Assume that we have more than **two** Support deps. :-

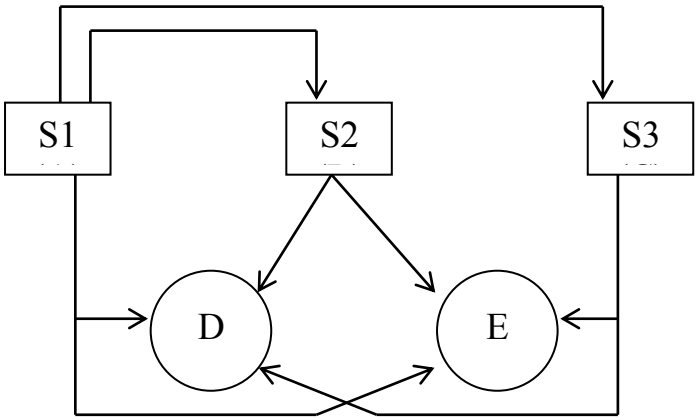
1) In the Direct method:-



S: Service dep.

O: Operating dep.

2) In the Step down method:-



A gives B, C 45%

B gives A, C 30%

C gives B, A 25%

	A	B	C	D	E
A	—	15%	30%	40%	15%
B	20%	—	10%	50%	20%
C	10%	15%	—	40%	15%

3) In the Reciprocal allocation method:-

- we make **three** linear equations:-

A total cost = A cost + 20% B + 10% C ⟶ **(1)**

B total cost = B cost + 15% A + 15% C ⟶ **(2)**

C total cost = C cost + 30% A + 10% B ⟶ **(3)**

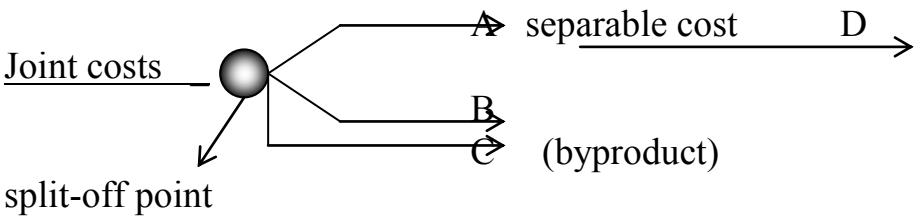
5

Chapter 16
Cost Allocation: Joint Products & Byproducts

* **Joint products:** Two or more products that have **high sales values** compared with the sales of other products that yields in the joint process.

* **Byproducts:** Products from a joint production process that have **low sales value** compared with the sales value of joint products (main products).

* هي منتجات تنتج من خلال إنتاج السلع الأصلية.



* **Joint costs:** the costs of a production process that yields multiple products simultaneously.

* **Separable costs:** all costs incurred beyond the split-off point (manufacturing, marketing, distribution, and so on).

*** Approaches to allocating Joint costs:-**

1) allocating joint costs using physical units produced.

* التوزيع على أساس عدد الوحدات الناتجة

2) allocating joint costs using market based data.

* التوزيع بالاعتماد على بيانات السوق.

*** we have three methods that use the Market based data approache:-**

1) Sales value at split-off point:-

- allocates joint costs to joint products on yhe basis of the relative Total sales value at the split-off point of the total production of these products.

2) Estimated Net Realizable Value (NRV):- * صافي القيمة الممكن تحقيقها

- allocates joint costs to joint products on the basis of the relative NRV (NRV = final sales value – separable costs) of the total production of the joint products.

3) Constant gross – margin percentage NRV:- * نسبة هاش ربح ثابتة

- allocates joint costs to joint products in such a way that the overall gross – margin percentage is identical for the individual products.

*** EX:-** A&O company purchases raw materials processes it until the split-off point, when **<u>two</u>** products A,B emerge, which they are sold to other independent company. (no B.B. inventory)

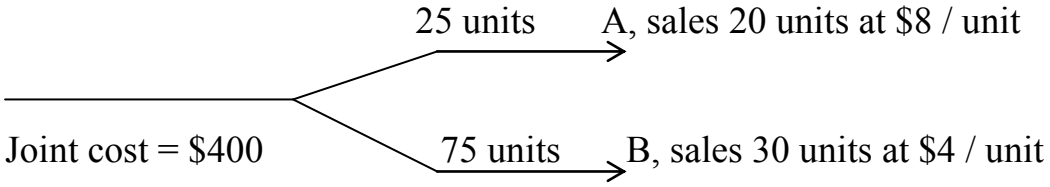
Product	Production	Sales	E.B. inventory
A	25	20 at $8 / unit	5
B	75	30 at $4 / unit	45

* the cost of purchasing and processing the raw materials until the Split-off point is $400

- Required:-

- allocate joint costs using the previous methods.

► Solution:-



1) Allocating joint costs based on <u>physical units produced</u>:-

Product	Units purchased	weighting	Allocation of joint cost	Cost / unit
A	25	.25 ($\frac{25}{100}$)	100 (400 × .25)	4 ($\frac{100}{25}$)
B	75	.75 ($\frac{75}{100}$)	300 (300 × .75)	4 ($\frac{300}{75}$)
	100		400	

Income Statement

		A	B	Total
	Sales Rev.	**160** (20 × 8)	**120** (30 × 4)	**280**
	– CGS:-			
CGS	*B.B. FG*	0	0	0
CGS	+ *C.G. manuf.*	100	300	400
CGS	– *E.B. FG* *1	(20)	(180)	(200)
	CGS	**<u>80</u>** (4 × 20)	**<u>120</u>** (4 × 30)	**<u>200</u>**
	Gross Profit *2	**<u>80</u>**	**<u>0</u>**	**<u>80</u>**

*1 E.B. FG = E.B. inventory × unit cost
*2 Gross Profit = Rev. – CGS

2) Allocating joint costs based on <u>sales value at split-off point</u>:-

Product	Sales value of split-off Point *1	weighting	Allocation of joint cost	Cost / unit
A	200 (25 × 8)	0.4 ($\frac{200}{500}$)	160 (400 × 0.4)	6.4 ($\frac{160}{25}$)
B	300 (75 × 4)	0.6 ($\frac{300}{500}$)	240 (400 × 0.6)	3.2 ($\frac{240}{75}$)
	500			

*1 second column = all units produced × selling price / unit

*** NOTE:-**
- This method uses the sales value of the entire production of the accounting period, not just those sold

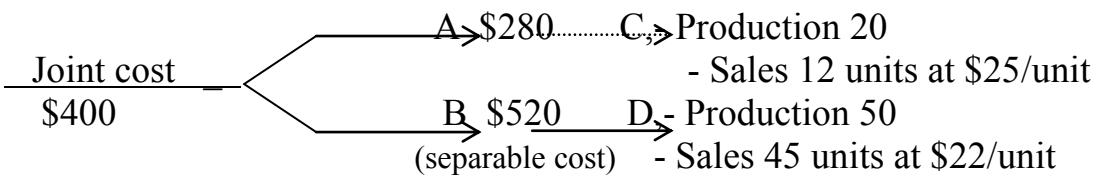
Income Statement

		A	B	Total
	Sales value	**160**	**120**	**280**
	– CGS:-			
CGS	*B.B. FG*	0	0	0
CGS	+ *C.G. manuf.*	160	240	400
CGS	– *E.B. FG* *1	(32)	(144)	(176)
CGS	CGS	**128** (6.4 × 20)	**96**	**224**
	Gross Profit *2	**32**	**24**	**56**

*1 E.B. FG = E.B. inventory × unit cost
*2 Gross Profit = Rev. – CGS

*** EX:-** Assume the same data as in the previous example except that both products A,B are processed further as follow:-

(Further processing)



► Solution:-

3) Allocating joint cost based on <u>estimated NRV:-</u>

- this method is often used for joint products that have no market value at split-off point.

So, we use it for products that will be further processed.

Product	Sales value	Separable cost	Estimated NRV	weighting	Allocation of joint cost	Cost / unit*1
C	500 (20 × 25)	280	220 (500 – 280)	0.275 (220 / 800)	110 (0.275 × 400)	19.5 (280 + 110 / 20)
D	1,00 (50 × 22)	520	580 (1,100 – 520)	0.725 (580 / 800)	290 (0.725 × 400)	16.2 (520 + 290 / 50)
	1,600		800			

*1 cost / unit = separable cost + allocation of joint cost / production

Income Statement

		C	D	Total
	Sales value	300	990	1,290
	– CGS:-			
CGS	*B.B. FG*	0	0	0
CGS	*+C.G. manuf* *1.	390	810	1,200
CGS	*–E.B. FG*	(156)	(81)	(237)
	CGS	234	729	963
	Gross Profit	**66**	**261**	**327**

*1 C.G. manuf. = separable cost + allocation of joint cost

4) Constant gross margin percentage NRV:-

a- compute the overall gross margin percentage:

	C	D	Total
Expected sales Rev.			1,600
–(joint cost + separable cost)	(400 + 280 + 52)		(1,200)
Gross margin			**400**
Gross margin percentage			*0.25 (400 / 1,600)*

b- Allocating:-

	C	D	Total
Expected sales Rev.	500	1,100	1,600
– Gross margin, using overall	(125*1) (500 × 25%)	(275) (1,100 × 25%)	(400)
C.G. available for sale	375	825	1200
– separable cost	(280)	(520)	(800)
Joint cost	**95**	**305**	**400**

*1 sales value × grossa margin percentage (25%)

* Sell or Process further?:-

- The decision to incur additional costs for further processing should be based on the incremental operating income attainable beyond the split-off point.

*** Further processing A to C:-**

- Incremental Revenues = Rev. C – Rev. A
  = (20 × $25) – (25 × $8)
  = $500 – $200
  = $300

- Incremental cost (separable cost) = $280

- Incremental Income = Incremental Rev. – Incremental cost
  = $300 – $280
  = $20, (we will gain $20 if A is further processed to C)

*** Further processing B to D:-**

- Incremental Revenues = Rev. D – Rev.B
  = (50 × $22) – (75 × $4)
  = 1,100 – 300
  = $800

- Incremental cost = $520

- Incremental Income = Incremental Rev. – Incremental cost
  = $800 – $520
  = $280

*** NOTE:-**

- If operating income increased (Incremental income positive), then the products should be further processed.
If Not, it is preferred to be sold at split-off point without further processing.

* Accounting for Byproducts:-

- We have **two** methods to process byproducts:-

1) Byproducts Recognized at time of production is completed:-

- نعتبر byproduct هنا inventory ، ولكن عملية البيع لا نعتبرها Revenue بل تعتبر تخفيض لتكاليف المنتج الرئيسي

- وتسمى أيضاً:- (Production Method) or (Cost Reduction)

2) Byproducts Recognized at time of sale:-

- Byproducts are reported as a Revenue at time of sale وبالتالي نعترف بها كـ Revenue وليس كتخفيض من تكاليف المنتج الرئيسي

- وتسمى أيضاً:- (Sales Method) or (Revenue Method)

*** EX:-** M company produces **two** products A (main product) and B (byproduct), both products are sold **split-off point** without further processing.
For July joint cost were **$25,000** ($15,000 DM, $10,000 C.C).

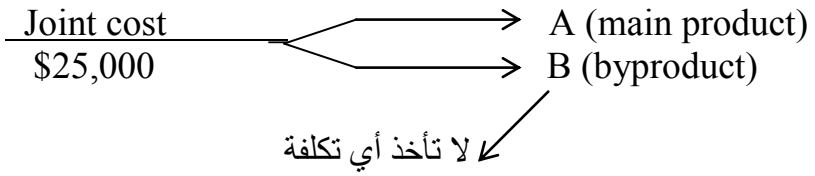
* The following data is for the company on July:-

Product		Production	Sales	B.B. Inv.	E.B. Inv.	Selling price
(main product)	**A**	500	400	0	100	$60 / unit
(byproduct)	**B**	100	30	0	70	$4 / unit

- Required:-

- What is the gross margin for M company under the **two** methods.

► Solution:-



	Recognized at Production	Recognized at Sale
Revenues:-		
Main product Rev.	24,000 (400 × $60)	24,000 (900 × 60)
Byproduct Rev.	—	120 (30 × 4)
Total Rev.	24,000	24,120
– CGS:-		
B.B. Inv.	0	0
+ manuf. Cost (joint cost)	25,000	25,000
- byproduct Rev.	(400) (100 × $4)	—
Net manuf. Cost	24,600	25,000
– E.B. Inv. (main product)	(4,920)	(5,000)
CGS	19,680	20,000
Gross margin	**4,320**	**4,120**
Inventoriable costs (end of period):-		
Main product	4,920	5,000
Byproduct	280 (70 × 4)	0

* E.B. Inv. (main product) = $\frac{\text{Net manuf. Cost}}{\text{Unit cost}} \times$ E.B. Inv. (units)

* Recording Entries:-

*** <u>Byproducts Recognized at time of production:-</u>**

1) To record DM purchased and used in production:-

- Dr. WIP 15,000
Cr. A/P 15,000

2) To record C.C in the production process:-

- Dr. WIP 10,000
Cr. Various accounts 10,000

3) To record cost of goods completed:-

- Dr. FG (main product) 24,600
Byproduct Inv. 400
Cr. WIP 25,000

4) To record the cost of main product sold:-

- Dr. CGS 19,680
Cr. FG 19,680

5) To record the sales of the main product:-

- Dr. Cash **<u>or</u>** A/R 24,000
Cr. Sales Rev. (main product) 24,000

6) To record the sales of byproduct:-

- Dr. Cash **<u>or</u>** A/R 120
Cr. Byproduct Inv. 120

*** <u>Byproducts recognized at time of sale:-</u>**

1), 2) and **5)** same as the previous method

3) To record cost of goods completed:-

- Dr. FG (main product) 25,000
Cr. WIP 25,000

4) To record the cost of the main product sold:-

- Dr. CGS 20,000
Cr. FG 20,000

6) To record the sales of byproduct:-

- Dr. Cash **<u>or</u>** A/R 120
Cr. Byproduct Rev. 120

Chapter 7

6

Flexible Budgets, Direct-Cost Variances, and Management Control

* **Variances:** differences between amount based on actual results and amount supposed to be accodrding to budget amount.

* **Static budget:** budget based on output planned at the start of the budget period.

* **Flixible budget:** budget based on level of output actually achieved at the budget period.

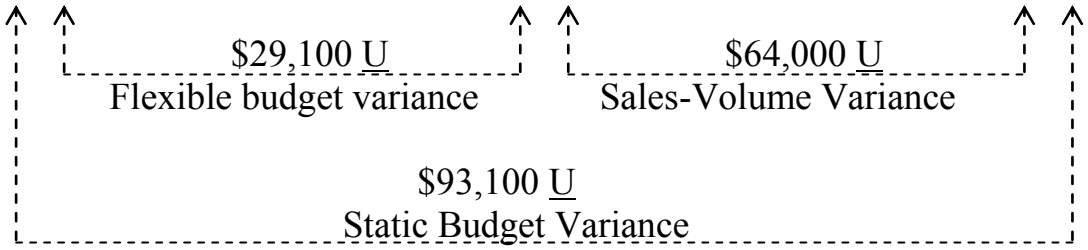
* **EX:-** A company manufactures and sells product B, all units manufactured in April 2003 are sold. There is no B.B. or E.B. inventories.
- The **budgeted** variable cost per product for each category are:-

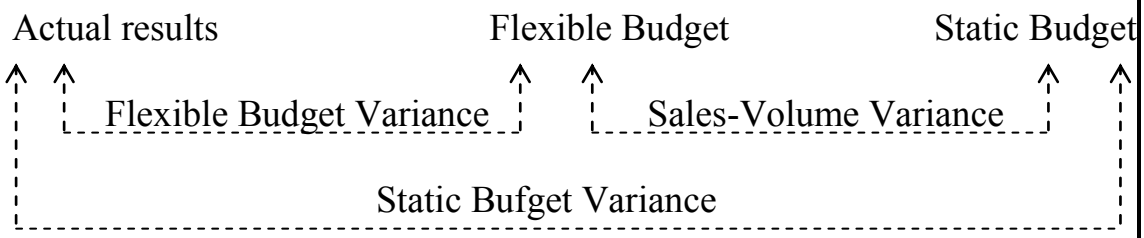
Cost Category	Variable cost / product
DM	$60
DL	$16
Variable OH	$12
Total	**$88**

- The budgeted fixed manufacturing cost $276,000
- The budgeted selling price $120 / unit.
- The static budgeted based on selling 12,000 units.
- Actual sales 10,000 units.
- Actual price $125 / unit.
- The actual variable cost: - DM $621,600
  - DL $198,000
  - V. OH $130,500
- The actual fixed OH $285,000

* (1) – (5) = Static Budget Variance

	Actual Quantity (AQ) × Actual Price (AP)	Price Variance	Actual Quantity (AQ) × Standard Price (SP)		
	(1) Actual results	**(2) = (1) – (3) Flexible Budget Variance**	**(3) Flexible Budget**	**(4) = (3) – (5) Sales-Volume Variances**	**(5) Static Budget**
Units sold	10,000	0	10,000	2,000 U	12,000
Revenue	**$1,250,000** (10,000 × $125)	**$50,000 F**	**$1,200,000** (10,000 × $120)	**$240,000 U**	**$1,440,000** (12,000× $120)
Variable cost:-					
DM	$621,600	$21,600 U	$600,000	$120,000 F	$720,000
DL	$198,000	$38,000 U	$160,000	$32,000 F	$192,000
V. OH	$130,000	$10,500 U	$120,000	$24,000 F	$144,000
Total V. OH	**$950,100**	**$70,100 U**	**$880,000**	**$176,000F**	**$1,056,000**
Contribution margin	**$299,900**	**$21,100**	**$320,000**	**$64,000 U**	**$384,000**
Fixed cost	$285,000	$9,000	$276,000	0	$276,000
Operating Income	**$14,900**	**$29,100 U**	**$44,000**	**$64,000 U**	**$108,000**





* **Sales-Volume Variance:** difference caused solely by difference in volume sold and volume expected to be sold in static budget.

* **Flexible-Budget Variance:** difference between actual result and Flexible Budget amount.

* **Static Budget Variance:** difference between actual result and Static Budget amount.

* Price Variance and efficiency variances for DM cost:-

* **Price variance** = (Actual Price – Budgeted Price) × Actual quantity purchased

$$= (AP - SP) \times AQ$$

➡ An (unfavorable) materials (DM) price varianc results when the actual price was greater than the standard price.

* **Efficiency Variance** $= \left(\begin{array}{c}\text{Actual quantity} \\ \text{used}\end{array} - \begin{array}{c}\text{Budgeted quantity of} \\ \text{input allowed for} \\ \text{actual output}\end{array}\right) \times \begin{array}{c}\text{Budgeted} \\ \text{price}\end{array}$

$$= (AQ - SQ) \times SP$$

* **EX:-** X company manufactures Z product, it uses its standard costing system when developing its Flexible-Budget amount. The actual units produced 10,000; DM purchased and used 22,200; and the standard DM input allowed for one unit of output is 2 square yards; $30 standard cost per square yards, and the actual price paid per square yards is $28.

- Required:-

1) calculate DM price variance.
2) calculate DM efficiency variance.
3) prepare journal entry to record the DM purchased and DM used.

► **Solution:-**

1) DM price variance = (AP – SP) × AQ
= ($28 – $30) × 22,200
= -2 × 22,200
= -$44,400 **or** $44,400 F

2) DM efficiency variance = (AQ – SQ) × SP
= (22,200 – 2×10,000) × $30
= (22,200 – 20,000) × $30
= 2,200 × $30
= $66,000 U

3) DM purchased:-

Dr. Material control	666,000		(22,200 × $30)
Cr. AP **or** Cash		621,600	(22,200 × $28)
DM price variance		44,400	(22,200 × $2)

DM used:-

Dr. WIP	600,000		(20,000 × $30)
DM efficiency variance	66,000		
Cr. Material control		666,000	(22,200 × $30)

* Price Variance and Efficiency Variance for DL cost:-

* **Price variance** = (Actual price of input – Budgeted price of input) × Actual quantity of input

= (AP – SP) × AQ

* **Efficiency variance** = (Actual quantity of input used – Budgeted quantity of input allowed for actual output) × Budgeted price of input

= (AQ – SQ) × SP

*** EX:-** X company manufactures Y-product, in April 2004, 10,000 units were produced; Actual manufacturing labor-hour were 9,000 at a total cost of $198,000 , standard manufacturing labor time allowed is 0.8 hour per output unit and the standard direct manufacturing labor cost is $20 / hour.

- Required:-

1) calculate DL price and efficiency variances.

2) prepare journal entry relted to requirement **(1)**

► Solution:-

Actual price of input = $\frac{\text{Total cost}}{\text{Actual hour used}}$

$= \frac{\$198{,}000}{9{,}000} = \$22$

1) Price Variance = $(AP - SP) \times AQ$

$= (\$22 - \$20) \times 9{,}000$

$= \$18{,}000$ U

Efficiency Variance = $(AQ - SQ) \times SP$

$= (9{,}000 - 0.8 \times 10{,}000) \times \$20$

$= 1{,}000 \times \$20$

$= 20{,}000$ U

Flexible budgeted variance = Actual cost incurred – Flexible-budget

$= \$198{,}000 - (10{,}000 \times 0.8 \times \$20)$

$= \$38{,}000$ U

*** NOTE:-**

- Flexible budget variance = Efficiency variance + Price Variance

2) Dr. WIP	160,000	
DL Price variance	18,000	
DL Efficiency variance	20,000	
Cr. Wages payable control		198,000

*** recording variance entry:-**

- U variance ⟶ (debited)
- F variance ⟶ (credited)

*** EX:-** Information on X company DM cost for the month of July 2003, was as follow:-

- Actual quantity purchased 30,000 units
- Actual price of units purchased $2.75
- DM purchased – Price variance $1,500 U
- Standard quantity allowed for actual production 24,000 units
- Actual quantity used 22,000 units

- Required:-

- For July 2003, calculate DM efficiency variance.

► Solution:-

From DM Price variance we find the Standard price (SP)

DM Price variance = (AP – SP) × AQ

$1,500 = ($2.75 – SP) × 30,000

$1,500 / 30,000 = $2.75 – SP

.05 = $2.75 – SP

SP = $2.7

DM Efficiency Variance = (AQ – SQ) × SP

= (22,000 – 24,000) × $2.7

= -2,000 × $2.7

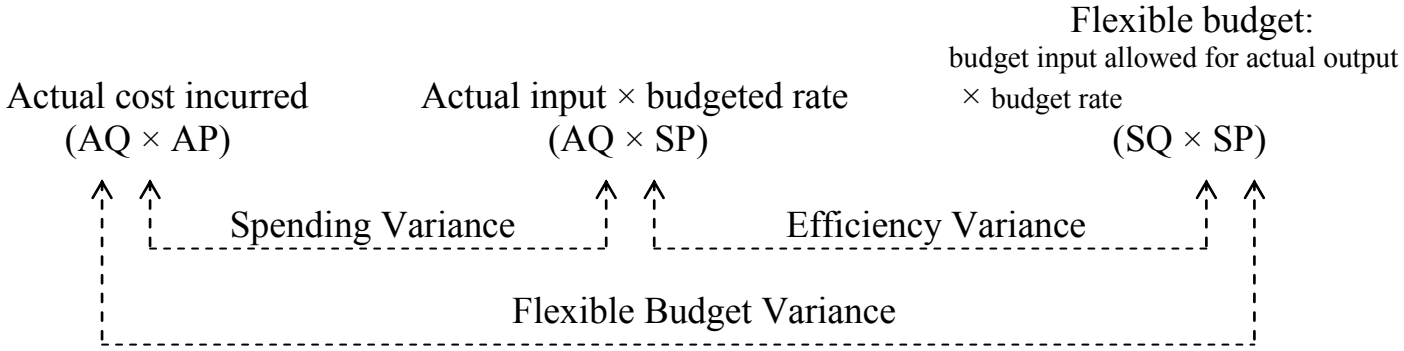
= -5,400 **or** 5,400 F

Chapter 8

7

Flexible Budgets, Overhead Cost Variances, and Management Control

*** Variable Overhead cost variances:-**



* Flexible budget variance = Actual cost incurred – Flexible budget amount For variable OH

$$\text{* Variable OH Efficiency variance} = \left(\begin{array}{l}\text{Actual quantity of variable OH cost allocation base used for actual output}\end{array} - \begin{array}{l}\text{Budgeted quantity of variable OH cost allocation base allowed for actual output}\end{array}\right) \times \text{budgeted V. OH rate}$$

$$= (AQ - SQ) \times SP$$

$$\text{* Variable OH Spending variance} = \left(\begin{array}{l}\text{Actual V. OH rate}\end{array} - \begin{array}{l}\text{Budgeted V. OH rate}\end{array}\right) \times \text{Actual quantity of V. OH cost allocation base used For actual output}$$

$$= (AQ - SP) \times AQ$$

*** EX:-** For X company assume that the actual machine-hours used 4,500; Flexible budget amount 4,000, the variable manufacturing overhead cost $130,500, the Flexible-budget amount $120,000

- Required:-

- compute the variable OH variances.

► Solution:-

***** Flexible budget variance = Actual cost – Flexible budget amount
= $130,500 – $120,000
= $10,500 U

***** Variable OH spending variance = (AP – SP) × AQ
= ($29 – $30) × 4,500
= -$4,500 **or** 4,500 F

***** Variable OH efficiency variance = (AQ – SQ) × SP
= (4,500 – 4,000) × $30
= 500 × $30 = $15,000 U

*** Fixed overhead cost variance:-**

		Allocated:
	Flexible budget	Budgeted input allowed for actual output
Actual cost incurred	(as in Static budget)	× Budgeted rate

Spending variance — Production-volume variance

Flexible-Budget variance

* Flexible-budget variance = Actual results – Flexible budget amount

* Fixed OH spending variance = Actual results – budgeted fixed OH

* Production-volume variance = $\left(\begin{matrix}\text{Budgeted} \\ \text{Fixed OH}\end{matrix} - \begin{matrix}\text{Fixed OH based on budgeted} \\ \text{input allowed for actual output}\end{matrix}\right) \times \begin{matrix}\text{Budgeted} \\ \text{rate}\end{matrix}$

* **EX:-** from the previous example; assume that the budgeted fixed OH is $276,000 and the actual amount $285,000, the Fixed OH for whole year budgeted to be $3,312,000 and machine hours 57,600

- Required:-

- compute the all Fixed OH variances.

► Solution:-

* Flexible budget variance = Actual cost – Flexible budget amount
= $285,000 – $276,000
= $9,000 U

* Fixed OH spending variance = Actual cost – Flexible budget amount
= $285,000 – $276,000
= $9,000 U

* Fixed OH production volume variance = $\left(\begin{matrix}\text{Budgeted fixed} \\ \text{OH}\end{matrix} - \begin{matrix}\text{Fixed OH based on} \\ \text{budgeted input for} \\ \text{actual output}\end{matrix}\right) \times \begin{matrix}\text{budgeted} \\ \text{rate}\end{matrix}$

= $276,000 – (4,000 × 57.5)
= $276,000 – $230,000
= $ 46,000 U

*** EX:-** X company allocates OH cost using machine-hour, the budgeted machine-hour was 10,000 for 2003, the following additional informations related to OH for 2003:-

- Budgeted Fixed OH	$600,000
- Actual Fixed OH	$590,000
- Budgeted variable OH	$1,000,000
- Actual variable OH	$1,100,000
- Budgeted machine-hours allowed for actual output	9,800
- Actual machine-hours used	9,500

- Required:-

1) compute the variable OH spending and efficiency variance.

2) compute the fixed OH spending and production-volume variance.

► Solution:-

1) variable OH spending variance = (AP – SP) × AQ

$$= \left(\frac{\$1,100,000}{9,500} - \frac{\$1,000,000}{10,000} \right) \times 9,500$$

$$= \$150,000 \text{ U}$$

variable OH efficiency variance = (AQ – SQ) × SP

$$= (9,500 - 9,800) \times \$100$$

$$= -\$30,000 \textbf{ or } 30,000 \text{ F}$$

2) Fixed OH spending variance = Actual cost – Budgeted fixed OH amount

$$= \$590,000 - \$600,000$$

$$= \$10,000 \text{ F}$$

$$\text{Production-volume} = \left(\begin{matrix} \text{Budgeted fixed} \\ \text{OH amount} \end{matrix} - \begin{matrix} \text{Fixed OH based on budgeted} \\ \text{input allowed for actual output} \end{matrix} \right)$$

$$= \$600,000 - 9,800 \times SP$$

$$= \$600,000 - 9,800 \times \frac{\$600,000}{10,000}$$

$$= \$12,000 \text{ U}$$

ABC Costing System

*** EX:-** Shareef Company manufactures two models of double bed: Thomas (A) and Hazem (B) model. The following activity and cost information has been compiled.

Product	Activity 1 No. of setup	Activity 2 No. of components	No. of Total DLHrs
Thomas (A)	20	10	375
Hazem (B)	30	15	225
Total	50 setups	25 components	600 DLHrs
Overhead costs	$25,000	$35,000	

1) Assume a Traditional Costing System applies the $60,000 of overhead costs based on DLHrs. What is the total amount of overhead costs assigned to the Thomas (A) model?

► **Solution:-**

- Rate of overhead cost / DLHrs = $60,000 ÷ 600 = $100 / H

- OH costs assigned to Thomas (A) model = 375 × $100 = $37,500

2) No. of setups and No. of components are identified as activity-cost drives for OH costs.
Assuming an ABC Costing System is used, What is the total amount of overhead costs assigned to the Hazem (B) model?

►**Solution:-**

- per setups = $25,000 ÷ 50 = $500 / one setup

- per component = $35,000 ÷ 25 = $1,400 / one component

- Total amount of OH costs assigned = (30 × $500) + (15 × $1,400)
  to the Hazem (B) model
  = $15,000 + $21,000
  = $36,000