

Chapter 17 Process Costing

□ Process Costing

↳ is a system where the unit cost of a product or service is obtained by assigning total cost to many identical or similar unit of output

لـ تكلفة، لعلية

لـ وهي نظام يتم فيه إكسول على تكلفة
لـ وحدة المنتج أو كلفة عن طريق تعيين إجمالي
لتكاليف للعديد من وحدات الإنتاج المتشابهة أو
لـ عائلة.

$$\square \text{ Cost per unit} = \frac{\text{Total Cost incurred}}{\text{\# of unit output}}$$

→ so, each unit receives the same or similar amount of **Direct material Cost**, **Direct labor Cost** and **Manufacturing overhead**.

□ In a **Job Costing system**, individual Job use different quantities of resources, so it would be incorrect to Cost each job at the same average production Cost

لهذا في نظام الـ [Job Costing] تستخدم الوحدة الفردية كميات مختلفة من المواد لذلك سيكون من الخطأ تقدير تكلفة كل وظيفة بنفس متوسط تكلفة الإنتاج

□ In Contrast, when identical or similar units of product or service are **mass-produced**, process Costing is used to Calculate an average production Cost for all unit produced

الضد قابل، عندما يتم إنتاج وحدات متشابهة أو مطابقة من منتجات أو كميات بحجم كبير، يتم استخدام ~~نظام~~ [Process Costing] كأحد متوسط تكلفة الإنتاج لجميع الوحدات المنتجة

Process Costing Categories

→ Process Costing system separate Cost into Cost Categories according to when Cost are introduced into the process

لـ يقوم نظام الـ [Process Costing] بـ فصل التكاليف إلى فئات التكاليف وفقاً للوقت أو حال التكاليف في العملية

[1] Direct material are usually added at the beginning of the Production Process, or at the start of work in a subsequent department down the assembly line

لـ عادة ما يتم إضافة المواد المباشرة في بداية عملية الإنتاج أو في بداية العمل في قسم لاحق أسفل خط الإنتاج

[2] Conversion Cost are generally added equally along the production process

لـ تكاليف التحويل بشكل عام بالتساوي على طول عملية الإنتاج

→ للتذكير →

Direct material	← →	Prime Cost	تكاليف أولية
Direct Labor			
Manufacturer overhead	← →	Conversion Cost	تكلفة التحويل
Direct Labor			

□ Process Costing 8 Three Case

- 1] No beginning or ending work in process inventory.
- 2] No beginning work in process inventory and some ending work in process inventory
- 3] Both beginning and ending work in process inventory are present

~~~~~ examples

**Case II** No ending or Beginning WIP inv.  
 → all Cost that were introduced to the process during the period will be assigned to the Finished unit → Leaving work-in-process inv. at the end of the period

# of unit = 50,000

~~~~~ WIP

DM 10,000

DL 10,000

MPH 30,000

end = 0

total = 50,000 →

~~~~~ FG

50,000

$$\text{Cost per unit} = \frac{50,000}{50,000} = \underline{\underline{1}}$$

## □ Five step Process Costing Allocation

1] Summarize the Flow of physical units of output  
لـ تحديد تدفق الوحدات المادية  
للناتج

2] Compute output in term of "equivalent unit"  
لـ حساب الناتج من هذه الوحدات المعالجة (المكافئة)

3] Summarize total Costs to account for  
لـ تحديد التكاليف الإجمالية للحساب

4] Compute "Per unit equivalent unit"  
لـ حساب التكلفة لكل وحدة مكافئة (مكافئة)

5] Assign total Costs to units Completed and to units in ending work-in-process

لـ تعيين إجمالي التكاليف للوحدات المكتملة والوحدات  
في انتهاء العمل الجاري

لـ تعيين بند التكلفة الإجمالية للوحدات التي تم ترديدها  
لـ حسابها ← FG

لـ كذلك تعيين التكلفة للوحدات المكتملة (Ending inventory)

6

Case [2] No Beginning inv. and some ending inv.

لیکے باہر

# of unit = 50,000

ending WIP inv = 10,000

WIP

DM 10,000

DL 10,000

MCH 30,000

AM

end = 10,000

# of unit Completed = 40,000

"FG" ← "تکون کسے جال"

→ Assume that the percentage of Completion of the unit 10,000 unit is 40%

→  $10,000 \times 40\% = 4,000 \rightarrow$  [Equivalent units]

Cost per unit =  $\frac{50,000}{40,000 + (10,000 \times 40\%)}$

=  $\frac{50,000}{44,000} = \underline{\underline{1.13}}$

## □ Equivalent Unit

□ a drive amount of output units that →

كمية مستقرة من وحدات الإنتاج التي ←

① Takes the quantity of each input in units Completed and in unfinished unit of WIP  
 لا يأخذ كمية كل المدخلات في الوحدات المنتهية وخطوط وحدات العمل المكتملة في العاكس (end WIP)

② Converts the quantity of input into the amount of Completed output units that could be produced with that Quantity of ~~out~~ input  
 لا تحول كمية المدخلات إلى كمية وحدات الإنتاج التي يمكن إنتاجها بهذه الكمية من المدخلات

□ Calculated separately for each input  
 ↳ Direct Material and Conversion Cost

✗

## □ Steps 1 and 2 Case 2

12-11

work-in-process Beg. = 0  
 Started during the month = 400  
 Completed = 175  
 work-in-process Ending = 225

مبدأ فيزيائي

### Step 1 Summarize the flow of physical Units

DM → added At the beginning of the process = 400

Completed = 175

Ending = 225 → 60% نسبة الانجاز

### Step 2 Compute output in terms of Equivalent unit

|                                            | DM                       | Conversion Cost         |
|--------------------------------------------|--------------------------|-------------------------|
| □ unit Completed and Transferred out (175) | 175                      | 175                     |
| □ Equivalent unit of Ending WIP (225)      | $225 \times 100\% = 225$ | $225 \times 60\% = 135$ |
| □ Total output in terms of Equivalent unit | = 400 unit               | = 310 unit              |

E.U = Equivalent unit

Denominator = 1

### Step 3 Summarize Total Cost to Account For

↳ Cost from Beg. WIP = zero

Total production  
Cost

DM  
32,000

+

Con. Cost  
18,600

= 50,600

From Step 2 → E.U.  $\left\{ \begin{array}{l} \text{DM} = 400 \\ \text{Con. Cost} = 310 \end{array} \right.$

### Step 4 Compute the Cost per Equivalent Unit

$$\text{DM} = \frac{32,000}{400} = 80\$$$

$$\text{Con. Cost} = \frac{18,600}{310} = 60\$$$

### Step 5 Assign Cost to unit Completed and T. out and to unit WIP inv.

Completed and  
T. out

DM  
175 x 80

+

Con. Cost  
175 x 60

↳ = 24,500

## Ending work in Process

Dell  
225 x 80

Con. Cost

~~135~~  
135 x 60

$$L_2 = 26,100 \leftarrow$$

□ Total Cost accounted for

$$= 24,500 + 26,100 = 50,600$$

قاعدة مهمة للتأكد من أن

→ Total Cost Account For = Total Cost Accounted for  
50,600 = 50,600

## Case 3

Beginning work in process = 225  
 Started during the month = 275  
 Completed = 400  
 Ending work in process = 100

500 total

### Assumptions فرضيات

① FIFO → First in First out  
 له يعني يجب أولاً اكمال العمل على الوحدات القديمة  
 ومن ثم ابدأ بالوحدات الجديدة

② WC → waighted Cost  
 له معناها يعني يتم التعامل مع الوحدات القديمة و  
 الوحدات الجديدة كأنها وحدات واحدة  
 يعني ← يتم التعامل معها كـ (Total) ← 500  
فلا يوجد تمييز

(12)

Weighted Average Cost method

400 units

400 units Completed and T. out  
100 units Ending wIP inv

Step 1: Summarize the flow of physical unit

From Beginning wIP inv = 225 unit

unit started during the month = 275 unit

unit Completed and Transferred out = 400

unit in ending wIP inv. = 100

Total unit accounted for = 500 unit

**Step 2** Compute output in terms of Equivalent unit

|                                             | <u>Diff</u>                 | <u>Con. Cost</u>          |
|---------------------------------------------|-----------------------------|---------------------------|
| unit Completed and T. out<br>(400)          | 400                         | 400                       |
| Equivalent unit of Ending<br>WIP (100)      | $100 \times 100\%$<br>= 100 | $100 \times 50\%$<br>= 50 |
| Total output in terms<br>of Equivalent unit | <u>500</u>                  | <u>450</u>                |

**Step 3** Summarize total Cost to account for

Beginning inventory  $\leftarrow$  = 26,100  $\rightarrow$  Diff 18,000  
 Con. cost = 8,100

Cost added in the Current period = 36,180  $\rightarrow$  Diff = 19,800  
 Con. cost = 16,380

Total = 62,280

Step 4 Compute the Cost per Equivalent unit

Cost incurred to date  
E.U of work to date

$$DM = \frac{37,800}{500} = 75.60$$

$$Con. Cost = \frac{24,480}{450} = 54.40$$


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Step 5 Assign Cost to unit Completed and T. out  
and unit Ending WIP inv.

Completed  
and T. out

$$DM = 400 \times 75.60 = 30,240$$

$$Con. Cost = 400 \times 54.40 = 21,760$$

$$\text{Total} = 52,000$$

$$DM = 100 \times 75.60 = 7,560$$

$$Con. Cost = 50 \times 54.40 = 2,720$$

$$\text{Total} = 10,280$$

ending  
WIP inv.

$$\text{Total Cost Accounted For} = 62,280$$

□ First in First out  $\Rightarrow$  FIFO

مبدأ  
القديم

← المبدأ

Beginning WIP inv = 225

Unit started during march = 275

Completed unit and T. Out = 400

Ending WIP inv = 100

Step 1 summarize the flow of physical unit

□ Unit From Beginning WIP = 225 } total = 500

□ Unit started during march = 275

□ Unit Completed and T. Out = 400

400

↓                      ↓

From Beg                      unit started and  
WIP = 225                      Completed = 175  $\Leftarrow (400 - 225)$

□ Unit in ending WIP inv = 100

□ Total unit Accounted for = 500

**Step 2** Compute output in terms of E.U.  
 في المخرج حسب الوحدات المكافئة

|                                                                                 | <u>Full</u>                     | <u>Con. Cost</u><br>100%-60%  |
|---------------------------------------------------------------------------------|---------------------------------|-------------------------------|
| □ Unit Completed and<br>T.out = 400<br>E.U to Complete to<br>Complete w I P inv | $225 \times 0\%$<br>= 0 E.U     | $225 \times 40\%$<br>= 90 E.U |
| □ Unit started and<br>Completed during<br>March 175                             | 175                             | 175                           |
| □ Ending w I P<br>inv. 100                                                      | $100 \times 100\%$<br>= 100 E.U | $100 \times 50\%$<br>= 50 E.U |
| Total out put<br>in terms of<br>Equivalent unit                                 | = 275                           | 315                           |
| Denominator ← هذا بكل المقام                                                    |                                 |                               |

### Step 3 summarize Cost to Account For

|                           | <u>DM</u>     | <u>Con. Cost</u> | <u>total</u>    |
|---------------------------|---------------|------------------|-----------------|
| □ Cost From Beg. WIP Inv. | 18,000        | + 8,100          | = 26,100        |
| □ Cost Added during March | 19,800        | + 16,380         | = 36,180        |
|                           | <u>37,800</u> | + <u>24,480</u>  | = <u>62,280</u> |

### Step 4 Compute the Cost per Equivalent unit

|                                      | <u>DM</u>                 | <u>Con. Cost</u>          |
|--------------------------------------|---------------------------|---------------------------|
| □ Cost added during the period March | $\frac{19,800}{275} = 72$ | $\frac{16,380}{315} = 52$ |
| Cost per unit                        | 72                        | 52                        |

Cost per unit

### Step 5 Assign Cost to unit Completed and T. out and to unit in ending WIP Inv.

Cost completed and T. out (400 unit) □ 225 from Beg WIP = 26,100  
 DM = 18,000 Con cost = 8,100

شرح قبل الخطة

□ 175 started and Completed

## Step 5

$$\square \text{ Cost to unit Completed and T. out} \quad \square \text{ Cost from Big WIP inv} = 26,100$$

$$\square \text{ Cost to Complete Big inv} = \text{Del} \quad (0 \text{ EU} \times 72/\text{unit}) = 0$$

$$= \text{Con. Cost} \quad (90 \text{ EU} \times 52/\text{unit}) = 4,680$$

$$\square \text{ Cost of unit started and completed during The month (175)}$$

$$\text{Del} = 175 \times 72 = 12,600$$

$$\text{Con Cost} = 175 \times 52 = 9,100$$

$$\text{Total Cost of unit Completed and T. out} = 26,100 + 4,680 + 12,600 + 9,100 = 52,480$$

$$\square \text{ Cost Assign to unit}$$

in ending WIP inv (100)

$$\text{Del} = 100 \times 72 = 7,200$$

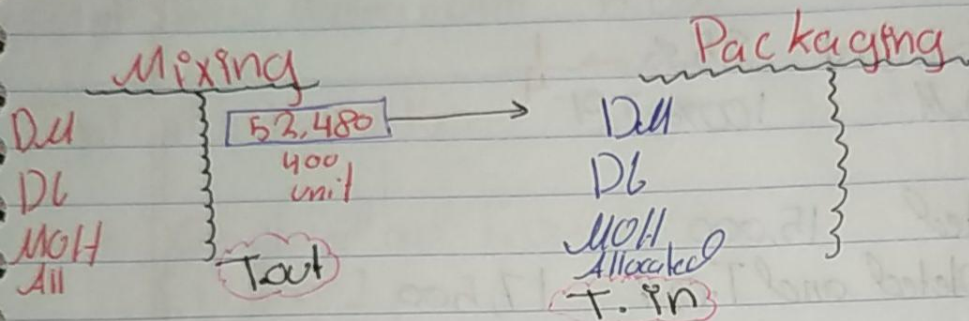
$$\text{Con Cost} = 50 \times 52 = \cancel{2,600} 2,600$$

$$\text{Total Cost Assign to ending WIP inv} = 9,800$$

$$\text{Total Cost Accounted For} = 9,800 + 52,480 = 62,280$$

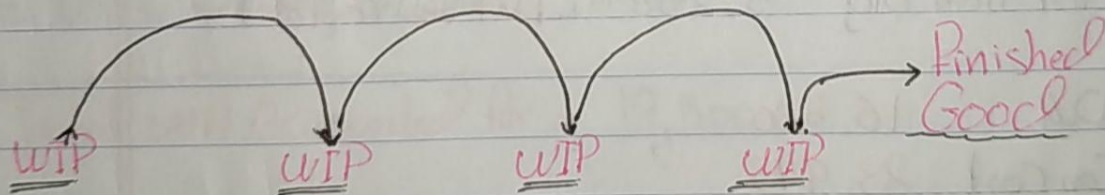
## Transferred in Cost

example = Juice Cans



## Mass production

الانتقال من مرحلة ت إلى مرحلة أخرى  
فتمثل مصروف التكاليف المنتجة



entry →

Dr. WIP inv → Packaging 52,480  
Cr. WIP inv → Mixing 52,480

or

Dr. WIP inv → X<sub>2</sub>  
Cr. WIP inv → X<sub>1</sub>

المطلوب

حل السؤال  
الموجود على  
ريشاج

□ Beginning WIP in 4,500

Con. Cost 25%  $\rightarrow \frac{1}{4}$   
DM 100%

□ Unit started 15,000

□ Unit Completed and T. out 17,500

□ Ending WIP inv 2,000  $\left\{ \begin{array}{l} \rightarrow \text{DM } 100\% \\ \rightarrow \text{Con. Cost } 75\% \rightarrow \frac{3}{4} \end{array} \right.$

□ Cost From Beg 5,250 [DM and Con. Cost]

□ DM 16,500

□ Con Cost 23,945

Step 1 summarize the flow of physical unit

- unit from Beg WIP inv 4,500
- unit started During month 15,000

Total unit to Account for 19,500

- unit Completed and T. out [ 17,500 ]

↳ unit from Beg WIP 4,500

↳ unit started and completed during month 13,000 → (17,500 - 4,500)

- units in ending WIP inv. 2,000

Total unit Accounted for = 19,500

Step 2 Compute output in term of E.U

|                                                          | DM                                  | Con. Cost                          |
|----------------------------------------------------------|-------------------------------------|------------------------------------|
| □ Unit Completed and<br>T. Out 17,500<br>E.U to Complete |                                     |                                    |
| □ Beg WIP inv                                            | $0\% \times 4,500$<br>= 0 E.U       | $75\% \times 4,500$<br>= 3,375 E.U |
| □ Unit started and<br>Completed during month             | 13,000                              | 13,000                             |
| □ E.U of ending<br>WIP inv (2,000)                       | $2,000 \times 100\%$<br>= 2,000 E.U | $2,000 \times 75\%$<br>= 1,500 E.U |
| □ Total output<br>in term of E.U                         | 15,000                              | 17,875                             |

Step 3 Summarize total Cost to Account For

|                              | DM     | Con. Cost | Total  |
|------------------------------|--------|-----------|--------|
| □ Cost of Beg<br>WIP         |        |           | 5,250  |
| □ Cost Added<br>during month | 16,500 | 23,945    | 40,445 |
|                              | 16,500 | 23,945    | 45,695 |

Step 4 Compute the Cost per Equivalent unit

|                                         | <u>DL</u> | <u>Con. Cost</u> |
|-----------------------------------------|-----------|------------------|
| Cost Added During the month             | 16,500    | 23,945           |
|                                         | ÷         | ÷                |
| Total output in term of Equivalent unit | 15,000    | 17,875           |
|                                         | <hr/>     | <hr/>            |
| =                                       | 1.1 \$    | 1.339 \$         |

Step 5 Assign Cost to unit Completed and T. out  
and to unit in ending WIP inv

|                                                                      | Mat                               | Con. Cost                             | total      |
|----------------------------------------------------------------------|-----------------------------------|---------------------------------------|------------|
| □ Cost of unit comp. and T. out                                      |                                   |                                       |            |
| → Cost of Beg WIP                                                    | ---                               | ---                                   | 5,250      |
| → Cost to Added and<br>to Completed Beg WIP                          | 0. EU                             | $3,375 \times 1.339$<br>$= 4,519.125$ | 4,519.125  |
| <u>Total Cost of Beg<br/>WIP inv</u>                                 | ---                               | ---                                   | 9,769.125  |
| □ Cost of unit started<br>and Completed during<br>the month (13,000) | $13,000 \times 1.1$<br>$= 14,300$ | $13,000 \times 1.339$<br>$= 17,407$   | 31,707     |
| □ <del>Total unit</del> Cost of<br>unit Comp. and T. out             | ---                               | ---                                   | 41,476.125 |
| □ Cost of unit in<br>ending WIP                                      | $2,000 \times 1.1$<br>$= 2,200$   | $1,500 \times 1.339$<br>$= 2,008.5$   | 4,208.5    |

total Cost  
Accounted For

= 45,695

هذا الرقم  
تقريباً  
الاعتماد