

Spoilage, rework, and scrap



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Managers have found that improved quality and intolerance for high spoilage have lowered overall costs and increased sales. 18-2 Spoilage—units of production that do not meet the standards required by customers for good units and that are discarded or sold at reduced prices. Rework—units of production that do not meet the specifications required by customers but which are subsequently repaired and sold as good finished units. Scrap—residual material that results from manufacturing a product. It has low total sales value compared to the total sales value of the product. 8-3 Yes.

Normal spoilage is spoilage inherent in a particular production process that arises even under efficient operating conditions. Management decides the spoilage rate it considers normal depending on the production process. 18-4 Abnormal spoilage is spoilage that is not inherent in a particular production process and would not arise under efficient operating conditions. Costs of abnormal spoilage are “lost costs,” measures of inefficiency that should be written off directly as losses for the accounting period. 18-5 Management effort can affect the spoilage rate. Many companies are relentlessly reducing their rates of normal spoilage, spurred on by competitors who, likewise, are continuously reducing costs. 18-6 Normal spoilage typically is expressed as a percentage of good units passing the inspection point.

Given actual spoiled units, we infer abnormal spoilage as follows: $\text{Abnormal spoilage} = \text{Actual spoilage} - \text{Normal spoilage}$ 18-7 Accounting for spoiled goods deals with cost assignment, rather than with cost incurrence, because the existence of spoiled goods does not involve any additional cost beyond the amount already incurred. 18-8 Yes. Normal spoilage rates should be computed from the good output or from the normal input, not the total input.

Normal spoilage is a given percentage of a certain output base. This base should never include abnormal spoilage, which is included in total input.

Abnormal spoilage does not vary in direct proportion to units produced, and to include it would cause the normal spoilage count to fluctuate irregularly and not vary in direct proportion to the output base. 18-9 Yes, the point of inspection is the key to the assignment of spoilage costs.

Normal spoilage costs do not attach solely to units transferred out. Thus, if units in ending work in process have passed inspection, they should have normal spoilage costs added to them. 18-10 No. If abnormal spoilage is detected at a different point in the production cycle than normal spoilage, then unit costs would differ. If, however normal and abnormal spoilage are detected at the same point in the production cycle, their unit costs would be the same. 18-11 No. Spoilage may be considered a normal characteristic of a given production cycle.

The costs of normal spoilage caused by a random malfunction of a machine would be charged as a part of the manufacturing overhead allocated to all jobs. Normal spoilage attributable to a specific job is charged to that job. 18-12 No. Unless there are special reasons for charging normal rework to jobs that contained the bad units, the costs of extra materials, labor, and so on are usually charged to manufacturing overhead and allocated to all jobs. 18-13 Yes. Abnormal rework is a loss just like abnormal spoilage. By charging it to manufacturing overhead, the abnormal rework costs are spread over other jobs and also included in inventory to the extent a job is not complete.

Abnormal rework is rework over and above what is expected during a period, and is recognized as a loss for that period. 8-14A company is justified in inventorying scrap when its estimated net realizable value is significant and the time between storing it and selling or reusing it is quite long. 18-15 Company managements measure scrap to measure efficiency and to also control a tempting source of theft. Managements of companies that report high levels of scrap focus attention on ways to reduce scrap and to use the scrap the company generates more profitably. Some companies, for example, might redesign products and processes to reduce scrap. Others may also examine if the scrap can be reused to save substantial input costs. 8-16(5-10 min.

) Normal and abnormal spoilage in units. 1. Total spoiled units 12,000
 Normal spoilage in units, 5% (132,000 6,600 Abnormal spoilage in units 5,400
 2. Abnormal spoilage, 5,400 (\$10\$ 54,000 Normal spoilage, 6,600 (\$10 66,000
 Potential savings, 12,000 (\$10\$120,000 Regardless of the targeted normal spoilage, abnormal spoilage is non-recurring and avoidable. The targeted normal spoilage rate is subject to change. Many companies have reduced their spoilage to almost zero, which would realize all potential savings. Of course, zero spoilage usually means higher-quality products, more customer satisfaction, more employee satisfaction, and various beneficial effects on nonmanufacturing (for example, purchasing) costs of direct materials.

18-17(20 min.)Weighted-average method, spoilage, equivalent units.

Solution Exhibit 18-17 calculates equivalent units of work done to date for direct materials and conversion costs. SOLUTION EXHIBIT 18-17 Summarize

<https://assignbuster.com/spoilage-rework-and-scrap/>

Output in Physical Units and Compute Output in Equivalent Units; Weighted-Average Method of Process Costing with Spoilage, Gray Manufacturing Company for November 2006.

	(Step 1)	(Step 2)			Equivalent Units			
Physical	Direct	Conversion			Flow of Production	Units	Materials	Costs
Work in process, beginning (given)	1,000				Started during current period	10,150 ^a		
To account for	11,150				Good units completed and transferred out			
during current period:	9,000	9,000			9,000			
Normal spoilage*	100				100 (100%)	100 (100%)	100	100
Abnormal spoilage†	50				50 (100%)	50 (100%)	50	50
Work in process, ending‡ (given)	2,000				2,000 (100%)	2,000 (30%)	2,000	600
Accounted for	11,150				11,150	9,750	a	

From below, 11,150 total units are accounted for. Therefore, units started during current period must be = 11,150 - 1,000 = 10,150. *Degree of completion of normal spoilage in this department: direct materials, 100%; conversion costs, 100%.

†Degree of completion of abnormal spoilage in this department: direct materials, 100%; conversion costs, 100%. ‡Degree of completion in this department: direct materials, 100%; conversion costs, 30%. 18-18(20(25 min. Weighted-average method, assigning costs (continuation of 18-17). Solution Exhibit 18-18 calculates the costs per equivalent unit for direct materials and conversion costs, summarizes total costs to account for, and assigns these costs to units completed and transferred out (including normal spoilage), to abnormal spoilage, and to units in ending work in process.

SOLUTION EXHIBIT 18-18 Compute Cost per Equivalent Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to

Spoiled Units, and to Units in Ending Work in Process; Weighted-Average Method of Process Costing, Gray Manufacturing Company, November 2006. |
 Total | | | | Production | Direct | Conversion | | | Costs | Materials | Costs | |
 (Step 3) Work in process, beginning (given) |\$ 2, 533 |\$ 1, 423 |\$ 1, 110 | |
 Costs added in current period (given) | 39, 930 | 12, 180 | 27, 750 | | Costs
 incurred to date | | 13, 603 | 28, 860 | | Divided by equivalent units of work
 done to date | |(11, 150 | (9, 750 | | Cost per equivalent unit | |\$ 1.

22 |\$ 2. 6 | |(Step 4) Total costs to account for |\$42, 463 | | | |(Step 5)
 Assignment of costs | | | | Good units completed and transferred out (9, 000
 units) | | | | Costs before adding normal spoilage |\$37, 620 | (9, 000# (\$1.
 22) + (9, 000# (\$2. 96) | | Normal spoilage (100 units) | 418 |(100# (\$1. 22)
 + (100# (\$2. 96) | |(A) Total cost of good units completed & transf. out | 38,
 038 | | |(B) Abnormal spoilage (50 units) | 209 |(50# (\$1.

22) + (50# (\$2. 96) | |(C) Work in process, ending (2, 000 units) | 4, 216 |(2,
 000# (\$1. 22) + (600# (\$2. 6) | |(A)+(B)+(C) Total costs accounted for |
 \$42, 463 | | #Equivalent units of direct materials and conversion costs
 calculated in Step 2 in Solution Exhibit 18-17. 18-19(15 min.)FIFO method,
 spoilage, equivalent units. Solution Exhibit 18-19 calculates equivalent units
 of work done in the current period for direct materials and conversion costs.

SOLUTION EXHIBIT 18-19 Summarize Output in Physical Units and Compute
 Output in Equivalent Units; First-in, First-out (FIFO) Method of Process
 Costing with Spoilage, Gray Manufacturing Company for November 2006. | |
 (Step 2) | | |(Step 1) | Equivalent Units | | | Physical | Direct | Conversion | |
 Flow of Production | Units | Materials | Costs | | Work in process, beginning

(given) | 1, 000 | | | Started during current period | 10, 150a | | | To account for | 11, 150 | | | Good units completed and transferred out during current period: | | | | From beginning work in process|| | 1, 000 | | | 1, 000 (100% (100%); 1, 000 (100% (50%) | | 0 | 500 | | Started and completed | 8, 000# | | | 8, 000 (100%; 8, 000 (100% | | 8, 000 | 8, 000 | | Normal spoilage* | 100 | | | 100 (100%; 100 (100% | | 100 | 100 | | Abnormal spoilage† | 50 | | | 50 (100%; 50 (100% | | 50 | 50 | | Work in process, ending‡ | 2, 000 | | | 2, 000 (100%; 2, 000 (30% | | 2, 000 | 600 | | Accounted for | 11, 150 | | | Work done in current period only | | 10, 150 | 9, 250 | a From below, 11, 150 total units are accounted for. Therefore, units started during current period must be $11, 150 - 1, 000 = 10, 150$. || Degree of completion in this department: direct materials, 100%; conversion costs, 50%. #9, 000 physical units completed and transferred out minus 1, 000 physical units completed and transferred out from beginning work-in-process inventory. *Degree of completion of normal spoilage in this department: direct materials, 100%; conversion costs, 100%. †Degree of completion of abnormal spoilage in this department: direct materials, 100%; conversion costs, 100%.

‡Degree of completion in this department: direct materials, 100%; conversion costs, 30%. 18-20(20(25 min.)FIFO method, assigning costs (continuation of 18-19). Solution Exhibit 18-20 calculates the costs per equivalent unit for direct materials and conversion costs, summarizes total costs to account for, and assigns these costs to units completed and transferred out (including normal spoilage), to abnormal spoilage, and to units in ending work in process. SOLUTION EXHIBIT 18-20 Compute Cost per

Equivalent Unit Costs, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units in Ending Work in Process; FIFO Method of Process Costing, Gray Manufacturing Company, November 2006.

	Total	Production	Direct	Conversion	Costs
Materials	Costs				
(Step 3) Work in process, beginning (given: \$1, 423 + \$1, 110)	\$ 2, 533				
Costs added in current period (given)		39, 930	\$12, 180	\$27, 750	
Divided by equivalent units of work done in current period		(10, 150)	(9, 250)		
Cost per equivalent unit		_____	\$ 1. 0	\$ 3	
(Step 4) Total costs to account for	\$42, 463				
(Step 5) Assignment of costs:					
Good units completed and transferred out (9, 000 units)					
Work in process, beginning (1, 000 units)	\$ 2, 533				
Costs added to beg.					

work in process in current period | 1, 500 |(0a (\$1. 0) + (500a (\$3) | | Total from beginning inventory before normal spoilage | | | Started and completed before normal spoilage (8, 000 units) | 4, 033 | | Normal spoilage (100 units) | 33, 600 |(8, 000a (\$1. 20) + (8, 000a (\$3) | |(A) Total costs of good units completed and transferred out | 420 |(100a (\$1. 20) + (100a (\$3) | |(B) Abnormal spoilage (50 units) | 38, 053 | | (C) Work in process, ending (2, 000 units) | 210 |(50a (\$1. 0) + (50a (\$3) | |(A)+(B)+(C) Total costs accounted for | 4, 200 |(2, 000a (\$1. 20) + (60a (\$3) | | \$42, 463 | | a Equivalent units of direct materials and conversion costs calculated in Step 2 in Solution Exhibit 18-19. 18-21(30 min.

)Weighted-average method, spoilage. 1. Solution Exhibit 18-21A calculates equivalent units of work done in the current period for direct materials and conversion costs. SOLUTION EXHIBIT 18-21A Summarize Output in Physical Units and Compute Output in Equivalent Units; Weighted-Average Method of <https://assignbuster.com/spoilage-rework-and-scrap/>

Process Costing with Spoilage, Appleton Company for August 2006. (Step 1)
 (Step 2) | | | Equivalent Units | | Flow of Production | Physical Units | Direct |
 Conversion | | | Materials | Costs | | Work in process, beginning (given) | 2,
 000 | | | Started during current period (given) | 10, 000 | | | To account for
 | 12, 000 | | | Good units completed and tsfd. out during current period: | 9,
 000 | 9, 000 | 9, 000 | | Normal spoilage^a | 900 | | | (900 [pic]100%; 900
 [pic]100%) | | 900 | 900 | | Abnormal spoilage^b | 300 | | | (300 [pic]100%; 300
 [pic]100%) | | 300 | 300 | | Work in process, ending^c (given) | 1, 800 | | | (1,
 800 [pic] 100%; 1, 800 [pic] 75%) | _____ | 1, 800 | 1, 350 | | Accounted for |
 12, 000 | | | Work done to date | | 12, 000 | 11, 550 | | | | ^aNormal
 spoilage is 10% of good units transferred out: 10% ? 9, 000 = 900 units.

Degree of completion of normal spoilage | | in this department: direct
 materials, 100%; conversion costs, 100%.

| | | ^bTotal spoilage = Beg. units + Units started - Good units tsfd. out -
 Ending units = 2, 000 + 10, 000 - 9, 000 - 1, 800 = 1, 200; | | Abnormal
 spoilage = Total spoilage - Normal spoilage = 1, 200 - 900 = 300 units.

Degree of completion of abnormal spoilage | | in this department: direct
 materials, 100%; conversion costs, 100%. | | | ^cDegree of completion in this
 department: direct materials, 100%; conversion costs, 75%. | | | 2 & 3.

Solution Exhibit 18-21B calculates the costs per equivalent unit for direct
 materials and conversion costs, summarizes total costs to account for, and
 assigns these costs to units completed and transferred out (including normal
 spoilage), to abnormal spoilage, and to units in ending work in process, using
 the weighted-average method.

SOLUTION EXHIBIT 18-21B Compute Cost per Equivalent Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units in Ending Work in Process; Weighted-Average Method of Process Costing, Appleton Company, August 2006.

| | Total |

Direct | Conversion | | | Production | Materials | Costs | | | Costs | | | (Step

3) | Work in process, beginning (given) | \$ 28, 600 | \$17, 700 | \$ 10, 900 | | |

Costs added in current period (given) | 174, 300 | 81, 300 | 93, 000 | | | Costs incurred to date | | \$99, 000 | \$103, 900 | | | Divide by equivalent units of work done to date | | [pic]12, 000 | [pic]11, 550 | | | Cost per equivalent unit |

_____ | \$ 8. 250 | \$ 8. 957 | (Step 4) | Total costs to account for | \$202, 900 |

| | (Step 5) | Assignment of costs: | | | | | Good units completed and transferred out (9, 000 units) | | | | | Costs before adding normal spoilage |

\$155, 211 | (9, 000d [pic]\$8. 25) + (9, 000 d | | | | [pic]\$8. 957) | | | Normal spoilage (900 units) | 15, 521 | (900d [pic]\$8. 25) + (900d [pic]\$8.

9957) | (A) | Total costs of good units completed and transferred out | 170, 732 | | | (B) | Abnormal spoilage (300 units) | 5, 174 | (300d [pic] \$8. 25) +

(300d [pic] \$8. 9957) | (C) | Work in process, ending (1, 800 units): | 26, 994 | (1, 800d [pic]\$8. 25) + (1, 350d | | | | [pic]\$8. 957) | (A) + (B) + (C) | Total costs accounted for | \$202, 900 | | | | | | | | | dEquivalent units of direct materials and conversion costs calculated in step 2 of Solution Exhibit 18-21A.

18-22 (30 min.)FIFO method, spoilage.

1. Solution Exhibit 18-22A calculates equivalent units of work done in the current period for direct materials and conversion costs. SOLUTION EXHIBIT 18-22A Summarize Output in Physical Units and Compute Output in Equivalent Units; FIFO Method of Process Costing with Spoilage, Appleton

Company for August 2006. (Step 1) (Step 2) | | | Equivalent Units | | Flow of Production | Physical Units | Direct | Conversion Costs | | | Materials | | | Work in process, beginning (given) | 2, 000 | | | Started during current period (given) | 10, 000 | | | To account for | 12, 000 | | | Good units completed and transferred out during current period: | | | | From beginning work in process a | 2, 000 | | | [$2, 000 \times (100\% - 100\%)$; $2, 000 \times 100\% - 50\%$] | 0 | 1, 000 | | Started and completed | 7, 000b | | | ($7, 000 \times 100\%$; $7, 000 \times 100\%$) | 7, 000 | 7, 000 | | Normal spoilagec | 900 | | | ($900 \times 100\%$; $900 \times 100\%$) | 900 | 900 | | Abnormal spoiled | 300 | | | ($300 \times 100\%$; $300 \times 00\%$) | 300 | 300 | | Work in process, ending (given) | 1, 800 | | | ($1, 800 \times 100\%$; $1, 800 \times 75\%$) | 1, 800 | 1, 350 | | Accounted for | 12, 000 | ____ | | | Work done in current period only | 10, 000 | 10, 550 | | | | | a Degree of completion in this department: direct materials, 100%; conversion costs, 50%. | b 9, 000 physical units completed and transferred out minus 2, 000 physical units completed and transferred out from beginning | | work-in-process inventory. | | c Normal spoilage is 10% of good units transferred out: $10\% \times 9, 000 = 900$ units. Degree of completion of normal spoilage in this | | department: direct materials, 100%; conversion costs, 100%.

| | d Total spoilage = Beg. units + Units started - Good units tsfd. Out - ending units = $2, 000 + 10, 000 - 9, 000 - 1, 800 = 1, 200$ | | Abnormal spoilage = Actual spoilage - Normal spoilage = $1, 200 - 900 = 300$ units. Degree of completion of abnormal spoilage in | | in this department: direct materials, 100%; conversion costs, 100%. | e Degree of completion in this department: direct materials, 100%; conversion costs, 75%. | 2 & 3. Solution

Exhibit 18-22B calculates the costs per equivalent unit for direct materials and conversion costs, summarizes total costs to account for, and assigns these costs to units completed and transferred out (including normal spoilage), to abnormal spoilage, and to units in ending work in process, using the FIFO method.

SOLUTION EXHIBIT 18-22B Compute Cost per Equivalent Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units in Ending Work in Process; FIFO Method of Process Costing, Appleton Company, August 2006.

	Total	Direct	Conversion
Production Materials Costs			
Costs (Step 3)			
Work in process, beginning (given)	\$17,700 + \$10,900	\$28,600	
Costs added in current period (given)	174,300	\$81,300	\$93,000
Divide by equivalent units of work done in current period	10,000	10,550	
Cost per equivalent unit	\$8.130	\$8.152	
Total costs to account for	\$202,900		
Assignment of costs:			
Good units completed and transferred out (9,000 units)			
Work in process, beginning (2,000 units)	\$28,600		
Costs added to beg. work in process in current period	8,815	(of \$8.13)	+ (1,000 of \$8.152)
Total from beginning inventory before normal spoilage	37,415		
Started and completed before normal spoilage (7,000 units)	118,616	(7,000 of \$8.13)	+ (7,000 of \$8.152)
Normal spoilage (900 units)	15,521	(900 of \$8.13)	+ (900 of \$8.152)
Total costs of good units completed and transferred out	171,282		
Abnormal spoilage (300 units)	5,084		

(300f ? \$8. 13) | + (300f ? \$8. 8152) | |(C) | Work in process, ending (1, 800 units): | 26, 534 |(1, 800f ? \$8. 13) | + (1, 350f ? \$8.

152) | |(A) + (B) + (C) | Total costs accounted for |\$202, 900 | | | | | | | | | | | | | |

| | | fEquivalent units of direct materials and conversion costs calculated in

step 2 in Solution Exhibit 18-22A. | 18-23 (30 min.) Standard-costing

method, spoilage. 1. Solution Exhibit 18-23A calculates equivalent units of

work done in the current period for direct materials and conversion costs. (It

is the same as Solution Exhibit 18-22A.) SOLUTION EXHIBIT 18-23A

Summarize Output in Physical Units and Compute Output in Equivalent Units;

Standard Costing Method of Process Costing with Spoilage, Appleton

Company for August 2006.

|(Step 1) |(Step 2) | | | | Equivalent Units | | Flow of Production | Physical Units

| Direct | Conversion Costs | | | | Materials | | | Work in process, beginning

(given) | 2, 000 | | | | Started during current period (given) | 10, 000 | | | | To

account for | 12, 000 | | | | Good units completed and transferred out during

current period: | | | | | From beginning work in process a | 2, 000 | | | | [2, 000

? (100% - 100%); 2, 000 ? 100% - 50%]| | 0| 1, 000 | | Started and

completed | 7, 000b | | | | (7, 000 ? 100%; 7, 000 ? 100%) | | 7, 000 | 7, 000 |

| Normal spoilagec | 900 | | | | (900 ? 100%; 900 ? 100%) | | 900 | 900 | |

Abnormal spoiledg | 300 | | | | (300 ? 100%; 300 ? 00%) | | 300 | 300 | |

Work in process, endinge (given) | 1, 800 | | | | (1, 800 ? 100%; 1, 800 ? 75%)

| | 1, 800 | 1, 350 | | Accounted for | 12, 000 | | | | Work done in current

period only | | 10, 000 | 10, 550 | | | | | | a Degree of completion in this

department: direct materials, 100%; conversion costs, 50%. | b 9, 000

physical units completed and transferred out minus 2, 000 physical units

completed and transferred out from beginning | | work-in-process inventory. |
 | c Normal spoilage is 10% of good units transferred out: $10\% \times 9,000 = 900$
 units. Degree of completion of normal spoilage in this | | department: direct
 materials, 100%; conversion costs, 100%. | | d Total spoilage = Beg. units +
 Units started - Good units tsfd. Out - ending units = $2,000 + 10,000 - 9,$
 $000 - 1,800 = 1,200$ | | Abnormal spoilage = Actual spoilage - Normal
 spoilage = $1,200 - 900 = 300$ units.

Degree of completion of abnormal spoilage in | | in this department: direct
 materials, 100%; conversion costs, 100%. | e Degree of completion in this
 department: direct materials, 100%; conversion costs, 75%. | 2 & 3. Solution
 Exhibit 18-23B calculates the costs per equivalent unit for direct materials
 and conversion costs, summarizes total costs to account for, and assigns
 these costs to units completed and transferred out (including normal
 spoilage), to abnormal spoilage, and to units in ending work in process, using
 standard costing. SOLUTION EXHIBIT 18-23B Compute Cost per Equivalent
 Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units
 Completed, to Spoiled Units, and to Units in Ending Work in Process;

Standard Costing Method of Process Costing, Appleton Company, August
 2006. | | Total | Direct | Conversion | | | Production | Materials | Costs | | | |
 Costs | | | (Step 3) | Standard cost per equivalent unit (given) | \$ 17. 50 | \$8.
 00 | \$9. 50 | | | Work in process, beginning (given) | \$ 25, 500 | (2, 000 ? \$8.
 00) |+ (1, 000 ? \$9. 50) | | | Costs added in current period at standard prices
 | 180, 225 | (10, 000 ? \$8. 00) |+ (10, 550 ? \$9. 0) | |(Step 4) | Total costs to
 account for |\$205, 725 | | | |(Step 5) | Assignment of costs at standard costs:
 | | | | | Good units completed and transferred out (9, 000 units) | | | | | Work

in process, beginning (2,000 units) | \$ 25,500 | | | | Costs added to beg.
work in process in current period | 9,500 | (of ? \$8.

00) | + (1,000 of ? \$9.50) | | | Total from beginning inventory before normal
spoilage | 35,000 | | | | Started and completed before normal spoilage (7,
000 units) | 122,500 | (7,000 of ? \$8.00) | + (7,000 of ? \$9.50) | | | Normal
spoilage (900 units) | 15,750 | (900 of ? \$8.00) | + (900 of ? \$9.00) | | (A) | Total
costs of good units completed and transferred out | 173,250 | | | (B) |
Abnormal spoilage (300 units) | 5,250 | (300 of ? \$8.00) | + (300 of ? \$9.

50) | | (C) | Work in process, ending (1,800 units): | 27,225 | (1,800 of ? \$8.
00) | + (1,350 of ? \$9.50) | | (A) + (B) + (C) | Total costs accounted for | \$205,
725 | | | f Equivalent units of direct materials and conversion costs
calculated in step 2 in Solution Exhibit 18-23A. | 18-24(25 min.) Weighted-
average method, spoilage. 1. Solution Exhibit 18-24, Panel A, calculates the
equivalent units of work done to date for each cost category in September
2006.

2. & 3. Solution Exhibit 18-24, Panel B, calculates the costs per equivalent
unit for each cost category, summarizes total costs to account for, and
assigns these costs to units completed (including normal spoilage), to
abnormal spoilage, and to units in ending work in process using the
weighted-average method. SOLUTION EXHIBIT 18-24 Weighted-Average
Method of Process Costing with Spoilage; Superchip, September 2006. PANEL
A: Steps 1 and 2—Summarize Output in Physical Units and Compute Output
in Equivalent Units | (Step 1) | (Step 2) | | | Equivalent Units | | Physical |
Direct | Conversion | | Flow of Production | Units | Materials | Costs | | Work in

process, beginning (given)	400				Started during current period (given)				
	1,700				To account for	2,100			
					Good units completed and transferred out				
					during current period:	1,400	1,400	1,400	
					Normal spoilage*	210			
					Abnormal spoilage†	190			
					Work in process, ending‡ (given)	300			
					Accounted for	2,100			
					Work done to date	2,100	1,920		

*Normal spoilage is 15% of good units transferred out: $15\% \times 1,400 = 210$ units.

Degree of completion of normal spoilage in this department: direct materials, 100%; conversion costs, 100%. †Total spoilage = $400 + 1,700 - 1,400 - 300 = 400$ units; Abnormal spoilage = Total spoilage (Normal spoilage = $400 - 210 = 190$ units.

Degree of completion of abnormal spoilage in this department: direct materials, 100%; conversion costs, 100%. ‡Degree of completion in this department: direct materials, 100%; conversion costs, 40%. SOLUTION

EXHIBIT 18-24 PANEL B: Steps 3, 4, and 5—Compute Cost per Equivalent Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units in Ending Work in Process

	Total	Production	Direct	Conversion	Costs	Materials	Costs
Work in process, beginning (given)	\$ 74,200	\$ 64,000	\$ 10,200				
Costs added in current period (given)	531,600	378,000	153,600				
Costs incurred to date	\$442,000	\$163,800					
Divided by equivalent units of work done to date	(2,100	(1,920					
Cost per equivalent unit costs of work done to date	(\$210.476	\$85.125					
(Step 4) Total costs to account for	\$605,800						
(Step 5) Assignment of costs							
Good units completed							

and transferred out (1, 400 units) | | | | Costs before adding normal spoilage
 |\$414, 104 |(1, 400#(\$210. 476) + (1, 400#(\$85. 3125) | | Normal spoilage
 (210 units) | 62, 116 |(210# (\$210.

476) + (210# (\$85. 125) | |(A) Total cost of good units completed and
 transferred out | | |(B) Abnormal spoilage (190 units) | 476, 220 | | |(C) Work
 in process, ending (300 units) | 56, 199 |(190# (\$210. 476) + (190# (\$85.
 3125) | |(A)+(B)+(C) Total costs accounted for | 73, 381 |(300# (\$210. 476)
 + (120# (\$85. 3125) | | \$605, 800 | | # Equivalent units of direct materials
 and conversion costs calculated in Step 2 in Panel A. 8-25 (25 min.

) FIFO method, spoilage. 1. Solution Exhibit 18-25, Panel A, calculates the
 equivalent units of work done in the current period for each cost category in
 September 2006. 2. & 3. Solution Exhibit 18-25, Panel B, calculates the costs
 per equivalent unit for each cost category, summarizes the total Microchip
 Department costs for September 2006, and assigns these costs to units
 completed and transferred out (including normal spoilage), to abnormal
 spoilage, and to units in ending work in process under the FIFO method.

SOLUTION EXHIBIT 18-25 First-in, First-out (FIFO) Method of Process Costing
 with Spoilage; Superchip, September 2006.

PANEL A: Steps 1 and 2—Summarize Output in Physical Units and Compute
 Output in Equivalent Units | | |(Step 2) | | |(Step 1) | Equivalent Units | | |
 Physical | Direct | Conversion | | Flow of Production | Units | Materials | Costs |
 | Work in rocess, beginning (given) | 400 | | | | Started during current period
 (given) | 1, 700 | | | | To account for | 2, 100 | | | | Good units completed and
 transferred out | | | | | during current period: | | | | | From beginning work in

process	400			400	(100%	(100%);	400	(100%	(30%)		0	280
Started and completed	1,000	#		1,000	(100%;	1,000	(100%				1,000	
	1,000			1,000	(100%;	210	(100%				210	
	210			210	(100%;	190	(100%				190	190
	190			190	(100%;	300	(40%				300	120
Accounted for	2,100			2,100							1,700	1,800

†Degree of completion in this department: direct materials, 100%; conversion costs, 30%. #1,400 physical units completed and transferred out minus 400 physical units completed and transferred out from beginning work in process inventory. Normal spoilage is 15% of good units transferred out: $15\% \times 1,400 = 210$ units. Degree of completion of normal spoilage in this department: direct materials, 100%; conversion costs, 100%. †Abnormal spoilage = Actual spoilage (Normal spoilage = $400 - 210 = 190$ units. Degree of completion of abnormal spoilage in this department: direct materials, 100%; conversion costs, 100%. ‡Degree of completion in this department: direct materials, 100%; conversion costs, 40%.

SOLUTION EXHIBIT 18-25 PANEL B: Steps 3, 4 and 5—Compute Cost per Equivalent Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units in Ending Work in Process

	Total	Production	Direct	Conversion	Costs	Materials
Costs						
(Step 3) Work in process, beginning	\$64,000 + \$70,200 (given)					
	\$74,200					
Costs added in current period (given)	531,600	378,000	153,600			
Divided by equivalent units of work done in						
current period						
	(1,700)	(1,800)				
Cost per equivalent unit	\$222.353	\$85.33				
(Step 4) Total costs to account for	\$605,800					
(Step 5) Assignment of costs:						

	Good units completed and transferred out (1, 400 units)		Work in process, beginning (400 units)		Costs added beg. work in process in current period	23, 893	(0\$ (\$222. 353) + (280\$ (\$85. 33)
Total from beginning inventory before normal spoilage					Started and completed before normal spoilage	98, 093	(1, 000 units)
Normal spoilage (210 units)				307, 686	(1, 000\$(\$222. 353) + (1, 000\$(\$85.		

333) (A) Total costs of good units completed and	64, 614	(210\$(\$222. 353) + (210\$(\$85. 333)	transferred out	(B) Abnormal spoilage (190 units)	470, 393	(C) Work in process, ending (300 units)	58, 461	
(190\$(\$222. 353) + (190\$(\$85. 33) (A)+(B)+(C) Total costs accounted for				76, 946	(300\$(\$222. 353) + (120\$ (\$85. 333)	\$605, 800		\$Equivalent units of direct materials and conversion costs calculated in Step 2 in Panel A.

18-26 (30 min.) Standard costing method, spoilage. 1. Solution Exhibit 18-25, Panel A, shows the computation of the equivalent units of work done in September 2006 for direct materials (1, 700 units) and conversion costs (1, 800 units). (This computation is the same for FIFO and standard-costing.) 2. The direct materials cost per equivalent unit of beginning work in process and of work done in September 2006 is the standard cost of \$210 given in the problem.

The conversion cost per equivalent unit of beginning work in process and of work done in September 2006 is the standard cost of \$80 given in the problem. 3. Solution Exhibit 18-26 summarizes the total costs to account for, and assigns these costs to units completed (including normal spoilage), to abnormal spoilage, and to units in ending work in process using the standard

costing method. SOLUTION EXHIBIT 18-26 Standard Costing Method of Process Costing with Spoilage; Superchip, September 2006. Steps 3, 4, and 5 —Compute Cost per Equivalent Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units in Ending Work in Process

	Total	Production	Direct	Conversion
Costs				
Materials				
Costs				
(Step 3) Standard costs per equivalent unit (given)				
\$ 290	\$ 210	\$ 80		
Work in process, beginning*	93, 600	(400 (\$210) +		
(120 (\$80)				
Costs added in current period at standard prices	501, 000			
(1, 700 (\$210) +				
(1, 800 (\$80)				
(Step 4) Costs to account for	\$594, 600			
(Step 5) Assignment of costs at standard costs:				
Good units completed and transferred out				
(1, 400 units)				
Work in process, beginning (400 units)	\$ 93, 600			
Costs added beg. ork in process in current period	22, 400	(0\$ (\$210) + (280\$ (\$80)		
Total from beginning inventory before normal		spoilage	116, 000	
Started and completed before normal spoilage		(1, 000 units)	290, 000	(1, 000\$ (\$210) + (1, 000\$ (\$80)
Normal spoilage (210 units)	60, 900	(210\$ (\$210) + (210\$ (\$80)		
(A) Total costs of good units completed and				
transferred out	466, 900			
(B) Abnormal spoilage (190 units)	55, 100	(190\$ (\$210) + (190\$ (\$80)		
(C) Work in process, ending (300 units)	72, 600	(300\$ (\$210) + (120\$ (\$80)		
(A)+(B)+(C) Total costs accounted for	\$594, 600			

*Work in process, beginning has 400 equivalent units (400 physical units (100%) of direct materials and 120 equivalent units (400 physical units (30%) of conversion costs. §Equivalent units of direct materials and conversion costs calculated in Step 2 in Solution Exhibit 18-25, Panel A.

18-27(20-30 min.)Spoilage and job costing. 1. Cash 200 Loss from Abnormal Spoilage
 1,000 Work-in-Process Control 1,200 Loss = $(\$6.00 \times 200) - \$200 = \$1,000$
 Remaining cases cost = $\$6.00$ per case. The cost of these cases is unaffected by the loss from abnormal spoilage.

2. a. Cash 400 Work-in-Process Control 400 The cost of the remaining good cases = $[(\$6.00 \times 2,500) - \$400] = \$14,600$
 The unit cost of a good case now becomes $\$14,600 \div 2,300 = \6.3478
 b. Cash 400 Manufacturing Department Overhead Control 800 Work-in-Process Control 1,200
 The unit cost of a good case remains at $\$6.00$.

c. The unit costs in 2a and 2b are different because in 2a the normal spoilage cost is charged as a cost of the job which has exacting job specifications. In 2b however, normal spoilage is due to the production process, not the particular attributes of this specific job. These costs are, therefore, charged as part of manufacturing overhead and the manufacturing overhead cost of $\$1$ per case already includes a provision for normal spoilage. 3. a. Work-in-Process Control 200 Materials Control, Wages Payable Control, Manufacturing Overhead Allocated 200
 The cost of the good cases = $[(\$6.00 \times 2,500) + \$200] = \$15,200$

The unit cost of a good case is $\$15,200 \div 2,500 = \6.08
 b. Manufacturing Department Overhead Control 200 Materials Control, Wages Payable Control, Manufacturing Overhead Allocated 200
 The unit cost of a good case = $\$6.00$ per case
 c. The unit costs in 3a and 3b are different because in 3a the normal rework cost is charged as a cost of the job which has exacting job specifications. In 3b however, normal rework is due to the production process, not the particular attributes of this specific job.

These costs are, therefore, charged as part of manufacturing overhead and the manufacturing overhead cost of \$1 per case already includes a provision for this normal rework.

18-28(15 min.) Reworked units, costs of rework. 1. The two alternative approaches to account for the materials costs of reworked units are: a. To charge the costs of rework to the current period as a separate expense item as abnormal rework. This approach would highlight to White Goods the costs of the supplier problem. b.

To charge the costs of the rework to manufacturing overhead as normal rework. 2. The \$50 tumbler cost is the cost of the actual tumblers included in the washing machines. The \$44 tumbler units from the new supplier were eventually never used in any washing machine and that supplier is now bankrupt. The units must now be disposed of at zero disposal value. 3. The total costs of rework due to the defective tumbler units include the following: a.

the labor and other conversion costs spent on substituting the new tumbler units; b. the costs of any extra negotiations to obtain the replacement tumbler units; c. any higher price the existing supplier may have charged to do a rush order for the replacement tumbler units; and d. ordering costs for the replacement tumbler units. 18-29(25 min.)Scrap, job costing. 1.

Journal entry to record scrap generated by a specific job and accounted for at the time scrap is sold is: Cash or Accounts Receivable490 Work-in-Process Control490 To recognize asset from sale of scrap. A memo posting is also made to the specific job record. 2. Scrap common to various jobs and

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accounted for at the time of its sale can be accounted for in two ways: a.

Regard scrap sales as a separate line item of revenues (the method

generally used when the dollar amount of scrap is immaterial): Cash or

Accounts Receivable 4,000 Sale of Scrap 4,000 To recognize revenue from

sale of scrap. b. Regard scrap sales as offsets against manufacturing

overhead (the method generally used when the dollar amount of scrap is

material): Cash or Accounts Receivable 4,000 Manufacturing Department

Overhead Control 4,000 To record cash raised from sale of scrap.

3. Journal entry to record scrap common to various jobs at the time scrap is

returned to storeroom: Materials Control 4,000 Manufacturing Department

Overhead Control 4,000 To record value of scrap returned to storeroom.

When the scrap is reused as direct material on a subsequent job, the journal

entry is: Work-in-Process Control 4,000 Materials Control 4,000 To record

reuse of scrap on a job. Explanations of journal entries are provided here but

are not required. 18-30 (30 min. Weighted-average method, spoilage.

Solution Exhibit 18-30 calculates the equivalent units of work done to date

for each cost category, presents computations of the costs per equivalent

unit for each cost category, summarizes total costs to account for, and

assigns these costs to units completed (including normal spoilage), to

abnormal spoilage, and to units in ending work in process using the

weighted-average method.

SOLUTION EXHIBIT 18-30 Weighted-Average Method of Process Costing with

Spoilage; Cleaning Department of the Alston Company for May. PANEL A:

Steps 1 and 2—Summarize Output in Physical Units and Compute Output in

Equivalent Units |(Step 1) |(Step 2) | | | Equivalent Units | | | Physical Units |

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Direct | Conversion | | Flow of Production | | Materials | Costs | | Work in process, beginning (given) | 1, 000 | | | Started during current period (given) | 9, 000 | | | To account for | 10, 000 | | | Good units completed and transferred out | | | | during current period: | 7, 400 | 7, 400 | 7, 400 | | Normal spoilage* | | | | 740 (100%; 740 (100% | 740 | 740 | 740 | | Abnormal spoilage† | | | | 260 (100%; 260 (100% | 260 | 260 | 260 | | Work in process, ending‡ (given) | | | | 1, 600 (100%; 1, 600 (25% | 1, 600 | 1, 600 | 400 | | Accounted for | | | | Work done to date | 10, 000 | 10, 000 | 8, 800 | *Normal spoilage is 10% of good units transferred out: $10\% \times 7,400 = 740$ units. Degree of completion of normal spoilage in this department: direct materials, 100%; conversion costs, 100%. †Total spoilage = $1,000 + 9,000 - 7,400 - 1,600 = 1,000$ units; Abnormal spoilage = $1,000 - 740 = 260$ units. Degree of completion of abnormal spoilage in this department: direct materials, 100%; conversion costs, 100%. ‡Degree of completion in this department: direct materials, 100%; conversion costs, 25%. SOLUTION EXHIBIT 18-30 PANEL B: Steps 3, 4, and 5—Compute Cost per Equivalent Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units in Ending Work in Process | Total | | | | Production | Direct | Conversion | | Costs | Materials | Costs | |(Step 3) Work in process, beginning (given) |\$ 1, 800 |\$ 1, 000 |\$ 800 | | Costs added in current period (given) | 17, 000 | 9, 000 | 8, 000 | | Costs incurred to date | | 10, 000 | 8, 800 | | Divided by equivalent units of work done to date | |(10, 000 |(8, 800 | | Cost per equivalent unit | _____ |\$ 1 |\$ 1 | |(Step 4) Total costs to account for |\$18, 800 | | |(Step 5) Assignment of costs | | | | Good units completed and transferred out (7, 400 units) | | | | Costs before adding normal spoilage |\$14, 800 | (7, 400# (\$1) + | (7, 400# (\$1) | | Normal

spoilage (740 units) | 1, 480 | (740# (\$1) + | (740# (\$1) | |(A) Total costs of
 good units completed and | | | | transferred out | 16, 280 | | | |(B) Abnormal
 spoilage (260 units) | 520 | (260# (\$1) + | (260# (\$1) | |(C) Work in process,
 ending (1, 600 units) | 2, 000 | (1, 600# (\$1) + | (400# (\$1) | |(A)+(B)+(C)
 Total costs accounted for | \$18, 800 | | | | | | #Equivalent units of direct
 materials and conversion costs calculated in Step 2 in Panel A above.

18-31(25 min.)FIFO method, spoilage. For the Cleaning Department,
 Solution Exhibit 18-31 calculates the equivalent units of work done in the
 current period for direct materials and conversion costs, presents the costs
 per equivalent unit for direct materials and conversion costs, summarizes the
 total costs for May, and assigns these costs to units completed and
 transferred out (including normal spoilage), to abnormal spoilage, and to
 units in ending work in process under the FIFO method. SOLUTION EXHIBIT
 18-31 First-in, First-out (FIFO) Method of Process Costing with Spoilage;
 Cleaning Department of the Alston Company for May. PANEL A: Steps 1 and
 2—Summarize Output in Physical Units and Compute Output in Equivalent
 Units | |(Step 2) | | |(Step 1) | Equivalent Units | | | Physical | Direct |
 Conversion | | Flow of Production | Units | Materials | Costs | | Work in
 process, beginning (given) | 1, 000 | | | | Started during current period
 (given) | 9, 000 | | | | To account for 10, 000 | | | | Good units completed and
 transferred out during current period: | | | | | From beginning work in
 process|| | 1, 000 | | | | 1, 000 ((100% (100%); 1, 000 ((100% (80%) | | 0 |
 200 | | Started and completed | 6, 400# | | | | 6, 400 (100%; 6, 400 (100% |
 | 6, 400 | 6, 400 | | Normal spoilage* | 740 | | | | 740 (100%; 740% (100% | |
 740 | 740 | | Abnormal spoilage† | 260 | | | | 260 (100%; 260 (100% | | 260 |

260 | | Work in process, ending ‡ | 1, 600 | | | 1, 600 (100%; 1, 600 (25% |
 _____ | 1, 600 | 400 | | Accounted for | 10, 000 | _____ | _____ | | Work done in
 current period only | | 9, 000 | 8, 000 | | | Degree of completion in this
 department: direct materials, 100%; conversion costs, 80%. #7, 400 physical
 units completed and transferred out minus 1, 000 physical units completed
 and transferred out from beginning work-in-process inventory. Normal
 spoilage is 10% of good units transferred out: 10% (7, 400 = 740 units.

Degree of completion of normal spoilage in this department: direct materials,
 100%; conversion costs, 100%. †Total spoilage = 1, 000 + 9, 000 - 7, 400 -
 1, 600 = 1, 000 units Abnormal spoilage = 1, 000 - 740 = 260 units. Degree
 of completion of abnormal spoilage in this department: direct materials,
 100%; conversion costs, 100%. ‡Degree of completion in this department:
 direct materials, 100%; conversion costs, 25%. SOLUTION EXHIBIT 18-31

PANEL B: Steps 3, 4, and 5—Compute Cost per Equivalent Unit, Summarize
 Total Costs to Account For, and Assign Total Costs to Units Completed, to
 Spoiled Units, and to Units in Ending Work in Process | Total | | | |

Production	Direct	Conversion	Costs	Materials	Costs
(Step 3) Work in process, beginning (given)	\$ 1, 800	\$1, 000	\$ 800		
Costs added in current period (given)	17, 000	9, 000	8, 000		
Divided by equivalent units of work done in current period	(9, 000	(8, 000			
Cost per equivalent unit	1	1	(Step 4) Total costs to account for	\$18, 800	(Step 5)
Assignment of costs:					
Good units completed and transferred out (7, 400 units)					
Work in process, beginning (1, 000 units)	\$ 1, 800				
Costs added to beg. work in process in current period	200	(0\$ (\$1) + (200\$			
(\$1) Total from beginning inventory before normal spoilage	2, 000				

Started and completed before normal spoilage (6,400 units) | 12,800 | (6,400\$ (\$1) + (6,400\$ (\$1) | | Normal spoilage (740 units) | 1,480 | (740\$ (\$1) + (740\$ (\$1) | |(A) Total costs of good units completed and transferred out | 16,280 | | |(B) Abnormal spoilage (260 units) | 520 | (260\$ (\$1) + (260\$ (\$1) | |(C) Work in process, ending (1,600 units) | 2,000 | (1,600\$ (\$1) + (400\$ (\$1) | |(A)+(B)+(C) Total costs accounted for | \$18,800 | | \$Equivalent units of direct materials and conversion costs calculated in Step 2 in Panel A. 18-32 (35 min).

Weighted-average method, Milling Department (continuation of 18-30). For the Milling Department, Solution Exhibit 18-32 calculates the equivalent units of work done to date for each cost category, presents computations of the costs per equivalent unit for each cost category, summarizes total costs to account for, and assigns these costs to units completed (including normal spoilage), to abnormal spoilage, and to units in ending work in process using the weighted-average method. SOLUTION EXHIBIT 18-32 Weighted-Average Method of Process Costing with Spoilage; Milling Department of the Alston Company for May. PANEL A: Steps 1 and 2—Summarize Output in Physical Units and Compute Output in Equivalent Units |(Step 1) |(Step 2) | | | | Equivalent Units | | | Physical Units | Transferred- | Direct | Conversion | | Flow of Production | | in Costs | Materials | Costs | | Work in process, beginning (given) | 3,000 | | | | Started during current period (given) | 7,400 | | | | To account for | 10,400 | | | | Good units completed and transferred out | | | | | during current period: | 6,000 | 6,000 | 6,000 | 6,000 | | Normal spoilage* | 300 | | | | 300 (100%; 300 (100%; 300 (100% | | 300 | 300 | 300 | | Abnormal spoilage† | 100 | | | | 100 (100%; 100 (100%,

100 (100% | | 100 | 100 | 100 | | Work in process, ending† (given) | 4, 000 | |
 | | | 4, 000 (100%; 4, 000 (0%; 4, 000 (25% | | 4, 000 | 0 | 1, 000 | |

Accounted for | 10, 400 | | | | Work done to date | | 10, 400 | 6, 400 | 7, 400

| *Normal spoilage is 5% of good units transferred out: 5% ? 6, 000 = 300

units. Degree of completion of normal spoilage in this department:

transferred-in costs, 100%; direct materials, 100%; conversion costs, 100%.

†Total spoilage = 3, 000 + 7, 400 - 6, 000 - 4, 000 = 400 units. Abnormal

spoilage = 400 - 300 = 100 units.

Degree of completion of abnormal spoilage in this department: transferred-in

costs, 100%; direct materials, 100%; conversion costs, 100%. ‡Degree of

completion in this department: transferred-in costs, 100%; direct materials,

0%; conversion costs, 25%. SOLUTION EXHIBIT 18-32PANEL B: Steps 3, 4,

and 5—Compute Cost per Equivalent Unit, Summarize Total Costs to Account

For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units

in Ending Work in Process | | Total | | | | | Production | Transferred-in | Direct

| Conversion | | | Costs | costs | Materials | Costs | | | | | |(Step 3) Work in

process, beginning (given) |\$ 8, 900 |\$ 6, 450 |\$ 0 |\$2, 450 | | Costs added in

current period (given) | 21, 870 | 16, 280* | 640 | 4, 950 | | Costs incurred to

date | | 22, 730 | 640 | 7, 400 | | Divided by equivalent units of work done to

date | |(10, 400 |(6, 400 |(7, 400 | | Cost per equivalent unit | |\$2. 1856 |\$ 0.

0 |\$ 1 | |(Step 4) Total costs to account for |\$30, 770 | | | | |(Step 5)

Assignment of costs | | | | | Good units completed and transferred out (6,

000 units) | | | | | Costs before adding normal spoilage |\$19, 713 | 6, 000#

((\$2. 1856 + \$0. 10 + \$1) | | Normal spoilage (300 units) | 986 | 300# ((\$2.

1856 + \$0. 0 + \$1) | |(A) Total cost of good units completed and transferred out | | |(B) Abnormal spoilage (100 units) | 20, 699 | | |(C) Work in process, ending (4, 000 units) | 329 | 100# ((\$2. 1856 + \$0. 10 + \$1) | |(A)+(B)+(C) Total costs accounted for | 9, 742 |(4, 000# (\$2. 1856)+(0# (\$0. 10)+(1, 000# (\$1) | | |\$30, 770 | | *Total costs of good units completed and transferred out in Step 5 Panel B of Solution Exhibit 18-30. #Equivalent units of direct materials and conversion costs calculated in Step 2 in Panel A above.

18-33(25 min.)FIFO method, Milling Department (continuation of 18-31). Solution Exhibit 18-33 shows the equivalent units of work done in the Milling Department in the current period for transferred-in costs, direct materials, and conversion costs, presents the costs per equivalent unit for transferred-in costs, direct materials, and conversion costs, summarizes the total Milling Department costs for May, and assigns these costs to units completed and transferred out (including normal spoilage), to abnormal spoilage, and to units in ending work-in-process under the FIFO method. SOLUTION EXHIBIT 18-33 First-in, First-out (FIFO) Method of Process Costing with Spoilage; Milling Department of the Alston Company for May. PANEL A: Steps 1 and 2— Summarize Output in Physical Units and Compute Output in Equivalent Units | | |(Step 2) | | |(Step 1) | Equivalent Units | | | Physical | Transferred- | Direct | Conversion | | Flow of Production | Units | in Costs | Materials | Costs | | Work in process, beginning (given) | 3, 000 | | | | Started during current period (given) | 7, 400 | | | | To account for | 10, 400 | | | | Good units completed and transferred out during | | | | | current period: | | | | | From beginning work in process|| | 3, 000 | | | | 3, 000 ((100% (100%); 3, 000 (| | | | |

(100% (0%); 3, 000 ((100% (80%) | | 0 | 3, 000 | 600 | | Started and completed | 3, 000# | | | | 3, 000 (100%; 3, 000 (100%; 3, 000 (100% | | 3, 000 | 3, 000 | 3, 000 | | Normal spoilage* | 300 | | | | 300 (100%; 300% (100%; 300 (100% | | 300 | 300 | 300 | | Abnormal spoilage† 100 | | | | 100 (100%; 100 (100%; 100 (100% | | 100 | 100 | 100 | | Work in process, ending‡ | 4, 000 | | | | 4, 000 (100%; 4, 000 (0%; 4, 000 (25% | | 4, 000 | 0 | 1, 000 | | Accounted for | 10, 400 | | | | Work done in current period only | | 7, 400 | 6, 400 | 5, 000 | || Degree of completion in this department: transferred-in costs, 100%; direct materials, 0%; conversion costs, 80%. 6, 000 physical units completed and transferred out minus 3, 000 physical units completed and transferred out from beginning work-in-process inventory.

*Normal spoilage is 5% of good units transferred out: $5\% (6, 000 = 300$ units.

Degree of completion of normal spoilage in this department: transferred-in costs, 100%; direct materials, 100%; conversion costs, 100%. †Total spoilage = $3, 000 + 7, 400 - 6, 000 - 4, 000 = 400$ units. Abnormal spoilage = $400 - 300 = 100$ units. Degree of completion of abnormal spoilage in this department: transferred-in costs, 100%; direct materials, 100%; conversion costs, 100%. ‡Degree of completion in this department: transferred-in costs, 100%; direct materials, 0%; conversion costs, 25%.

SOLUTION EXHIBIT 18-33
PANEL B: Steps 3, 4, and 5—Compute Cost per Equivalent Unit, Summarize Total Costs to Account For, and Assign Total Costs to Units Completed, to Spoiled Units, and to Units in Ending Work in Process | | Total | | | | Production | Transferred- | Direct | Conversion | | | Costs | in Costs | Materials | Costs | |(Step 3) Work in process, begin. given) | | | | |(\$6, 450 +

\$0 + \$2, 450) | \$ 8, 900 | | | | Costs added in current period (given) | 21, 870
 | 16, 280* | 640 | 4, 950 | | Divided by equivalent units of work done in | | | | |
 | current period | | (7, 400 | (6, 400 | (5, 000 | | Cost per equivalent unit | | \$
 2.

20 | \$ 0. 10 | \$ 0. 9 | | (Step 4) Total costs to account for | \$30, 770 | | | | (Step
 5) Assignment of costs: | | | | | Good units completed and transferred out (6,
 000 units) | | | | | Work in process, beginning (3, 000 units) | \$ 8, 900 | | |
 Costs added to beg. work in process in | | | | current period | 894 | (0 (\$2.
 20)+(3, 000\$(0. 10)+(600\$(\$0. 9) | | Total from beginning inventory before
 normal spoilage | | | | Started and completed before normal spoilage (3, 000
 units) | 9, 794 | | | Normal spoilage (300 units) | | | | (A) Total costs of good
 units completed and | 9, 870 | 3, 000\$((\$2.

20 + \$0. 10 + \$0. 99) | | transferred out | 987 | 300\$((\$2. 20 + \$0. 10 + \$0.
 9) | | (B) Abnormal spoilage (100 units) | | | | (C) Work in process, ending (4,
 000 units) | 20, 651 | | | (A)+(B)+(C) Total costs accounted for | 329 | 100\$(
 ((\$2. 20 + \$0.

10 + \$0. 99) | | | 9, 790 | (4, 000\$(\$2. 20)+(0\$(\$0. 10)+(1, 000\$(\$0. 99) | | |
 \$30, 770 | | *Total costs of good units completed and transferred out in Step
 5 Panel B of Solution Exhibit 18-31. §Equivalent units of direct materials and
 conversion costs calculated in Step 2 in Panel A. 18-34 (20(25 min.

) Job-costing spoilage and scrap. 1. a. Materials Control 600 Manufacturing
 Department Overhead Control 800 Work-in-Process Control 1, 400 (650 + 500
 + 250 = 1, 400) b. Accounts Receivable 1, 250 Work-in-Process Control 1, 250
 2. a. The clause does not specify whether the 1% calculation is to be based

on the input cost (\$26, 951 + \$15, 076 + \$7, 538) or the cost of the good output before the " 1% normal spoilage" is added.

b. If the inputs are used to determine the 1%: $\$26, 951 + \$15, 076 + \$7, 538 = \$49, 565$ 1% of $\$49, 565 = \$495. 65$ or $\$496$, rounded. Then, the entry to leave the $\$496$ " normal spoilage" cost on the job, remove the salvageable material, and charge manufacturing overhead would be: Materials Control 600 Manufacturing Department Overhead Control 304 Work-in-Process Control 904 ($\$800$ spoilage minus $\$496 = \304 spoilage cost that is taken out of the job; $\$600$ salvage value plus $\$304 = \904 ; or $\$1, 400$ minus $\$496 = \904) If the outputs are used to determine the 1%: $\$26, 951 - \$650 = \$26, 301$ 15, $076 - 500 = 14, 576$ 7, $538 - 250 = 7, 288$ $\$49, 565$ $\$48, 165$ Then, $\$48, 165$ (1% = $\$481. 65$ or $\$482$, rounded. The journal entry would be: Materials Control 600 Manufacturing Department Overhead Control 318 Work-in-Process Control 918 18-35(30 min.) Job costing, rework.

1. Work-in-Process Control (SM-5 motors) ($\$550$ (80) $44, 000$ Materials Control ($\$300$ (80) $24, 000$ Wages Payable ($\$60$ (80) $4, 800$ Manufacturing Overhead Allocated ($\$190$ (80) $15, 200$ Total costs assigned to 80 spoiled units of SM-5 Motors before considering rework costs. Manufacturing Department Overhead Control (rework) $9, 000$ Materials Control ($\$60$ (50) $3, 000$ Wages Payable ($\$45$ (50) $2, 250$ Manufacturing Overhead Allocated ($\$75$ (50) $3, 750$ Normal rework on 50 units, but not attributable specifically to the SM-5 motor batches or jobs. Loss from Abnormal Rework ($\$180$ (30) $5, 400$ Materials Control ($\$60$ (30) $1, 800$ Wages Payable ($\$45$ (30) $1, 350$ Manufacturing Overhead Allocated ($\$75$ (30) $2, 250$ Total costs of abnormal rework on 30 units (Abnormal rework = Actual rework - Normal rework = 80

- 50 = 30 units) of SM-5 Motors. Work-in-Process Control (SM-5 motors)6,000 Work-in-Process Control (RW-8 motors)3,000 Manufacturing Department Overhead Allocated (rework)9,000 (Allocating manufacturing department rework costs to SM-5 and RW-8 in the proportion 1,000: 500 since each motor requires the same number of machine-hours.) 2. Total rework costs for SM-5 motors in February 2004 are as follows: Normal rework costs allocated to SM-5\$ 6,000 Abnormal rework costs for SM-5 5,400 Total rework costs\$11,400 We emphasize two points: a.

Only \$6,000 of the normal rework costs are allocated to SM-5 even though the normal rework costs of the 50 SM-5 motors reworked equal \$9,000. The reason is that the normal rework costs are not specifically attributable to SM-5. For example, the machines happened to malfunction when SM-5 was being made, but the rework was not caused by the specific requirements of SM-5. If it were, then all \$9,000 would be charged to SM-5. b. Abnormal rework costs of \$5,400 are linked to SM-5 in the management control system even though for financial reporting purposes the abnormal rework costs are written off to the income statement. 18-36(30 min.

)Job costing, scrap. 1. Materials Control10,000 Manufacturing Overhead Control10,000 (To record scrap common to all jobs at the time it is returned to the storeroom) 2. Cash or Accounts Receivable10,000 Materials Control10,000 (To record sale of scrap from the storeroom) 3. A summary of the manufacturing costs for HM3 and JB4 before considering the value of scrap are as follows:

	HM3	JB4	Total Costs
Direct materials	\$200,000	\$150,000	\$350,000
Direct manufacturing labor	60,000	40,000	100,000
Manufacturing overhead			(200% of direct manufacturing labor)

120,000 | 80,000 | 200,000 | | Total manufacturing costs | \$380,000 | \$270,000 | \$650,000 | | Manufacturing cost per unit | \$19 | \$27 | | | (\$380,000 - \$20,000) / 20,000; (\$270,000 - \$10,000) / 10,000 | | | | The value of scrap of \$10,000 generated during March will reduce manufacturing overhead costs by \$10,000 from \$200,000 to \$190,000. Manufacturing overhead will then be allocated at 190% of direct manufacturing labor costs (\$190,000 / \$100,000 = 190%) The revised manufacturing cost per unit would then be: | HM3 | JB4 | Total Costs | | Direct materials | \$200,000 | \$150,000 | \$350,000 | | Direct manufacturing labor | 60,000 | 40,000 | 100,000 | | Manufacturing overhead | | | | (190% of direct manufacturing labor) | 114,000 | 76,000 | 190,000 | | Total manufacturing costs | \$374,000 | \$266,000 | \$640,000 | | Manufacturing cost per unit | \$18.70 | \$26.

60 | | | (\$374,000 - \$20,000) / 20,000; (\$266,000 - \$10,000) / 10,000 | | | | 18-37(15(20 min.) Physical units, inspection at various stages of completion (chapter appendix). | Inspection | Inspection | Inspection | | | at 15% | at 40% | at 100% | | Work in process, beginning (20%)* | 14,000 | 14,000 | 14,000 | | Started during March | 120,000 | 120,000 | 120,000 | | To account for | 134,000 | 134,000 | 134,000 | | Good units completed and transferred out | 113,000a | 113,000a | 113,000a | | Normal spoilage | 6,600b | 7,440c | 6,780d | | Abnormal spoilage (10,000 - normal spoilage) | 3,400 | 2,560 | 3,220 | | Work in process, ending (70%)* | 11,000 | 11,000 | 11,000 | | Accounted for | 134,000 | 134,000 | 134,000 | *Degree of completion for conversion costs of the forging process at the dates of the work-in-process inventories a14,000 beginning inventory +120,000 -10,000 spoiled - 11,000 ending inventory = 113,000 b6% ((113,000 - 14,000 + 11,000) = 6% (110,000

$= 6,600 \times 6\% = 396$ (113,000 + 11,000) = 6% (124,000) = 7,440
 $6\% \times 113,000 = 6,780$

18-38(25)(35 min. Weighted-average method, inspection at 80% completion (chapter appendix). The computation and allocation of spoilage is the most difficult part of this problem. The units in the ending inventory have passed inspection. Therefore, of the 80,000 units to account for (10,000 beginning + 70,000 started), 10,000 must have been spoiled in June [80,000 - (50,000 completed + 20,000 ending inventory)].

Normal spoilage is 7,000 [0.10 (50,000 + 20,000)]. The 3,000 remainder is abnormal spoilage (10,000 - 7,000). Solution Exhibit 18-38, Panel A, calculates the equivalent units of work done for each cost category. We comment on several points in this calculation: Ending work in process includes an element of normal spoilage since all the ending WIP have passed the point of inspection--inspection occurs when production is 80% complete, while the units in ending WIP are 95% complete.

- Spoilage includes no direct materials units because spoiled units are detected and removed from the finishing activity when inspection occurs at the time production is 80% complete. Direct materials are added only later when production is 90% complete.

- Direct materials units are included for ending work in process, which is 95% complete, but not for beginning work in process, which is 25% complete. The reason is that direct materials are added when production is 90% complete. The ending work in process, therefore, contains direct materials units; the beginning work in process does not.