



**BA 385T – Financial Management – Accounting Portion – Fall 2023**  
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**Class #4, #5, and #6 – Wednesday August 30 through Monday September 11**  
**Topic #3 – Cost Allocation and Activity-Based-Costing (ABC) Systems**

**Case – Wilkerson Company**

**Article – What Does Knee Surgery Really Cost?**

**Article – You Need a New Cost System When...**

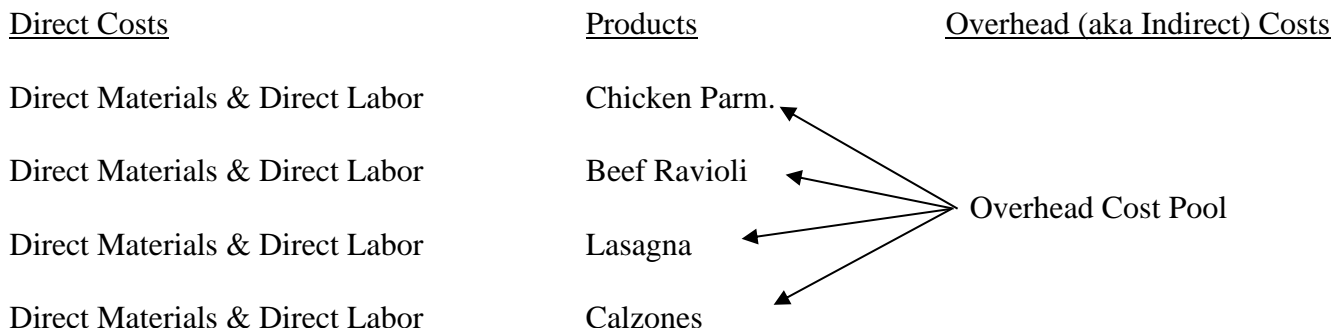
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What are the two basic questions every company better know the answer to?

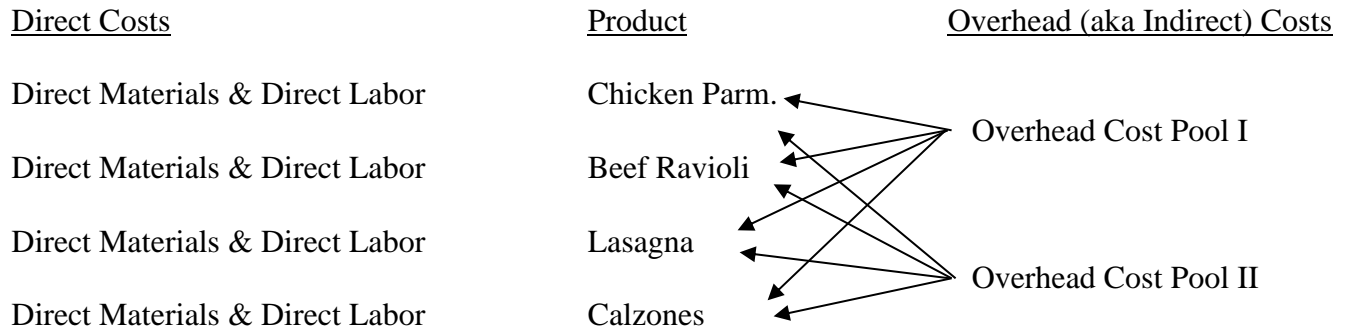
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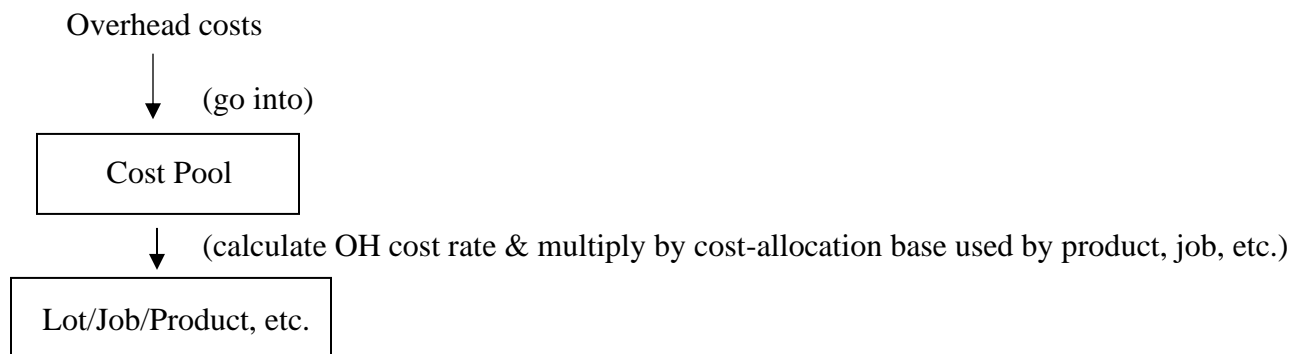
A company could have one overhead (aka indirect) cost pool...



Or a company could have many overhead cost pools....



No matter how many overhead cost pools, within each cost pool we have to compute an overhead cost rate.



How do you calculate the overhead cost allocation rate (aka overhead allocation rate, aka overhead cost rate, aka overhead rate, aka burden rate)?

Overhead Cost Rate= Overhead Costs in cost pool / Amount of Cost-Allocation Base for that cost pool

Before we get to the case, let's do an example...

ABC Inc. is a running shoe manufacturer and has three products – Shoe A, Shoe B, and Shoe C.

So, calculating how much leather, shoelaces, and direct labor go to each shoe is easy because they are direct costs. But how do you allocate the following overhead costs (aka indirect costs) to the three products?

Production Supervisor's salary	\$200,000 per year
Factory rent	\$400,000 per year
Factory electricity	\$1,000,000 per year
Maintenance labor wages	\$800,000 per year

We need some more information...

ABC Inc. has two overhead cost pools. Overhead cost pool 1 consists of the Production Supervisor's salary and factory rent and the cost-allocation base is direct labor hours. (I know in real life you would NEVER allocate rent by direct labor hours, but just go with it for this example.) Overhead cost pool 2 consists of factory electricity and maintenance labor wages and the cost-allocation base is machine hours.

	<u>Annual Direct Labor Hours Budgeted &amp; Actual</u>	<u>Annual Machine Hrs Budgeted &amp; Actual</u>
Shoe A	300,000	400,000
Shoe B	500,000	100,000
Shoe C	200,000	1,000,000

So, how much overhead should be allocated to each of the three products?

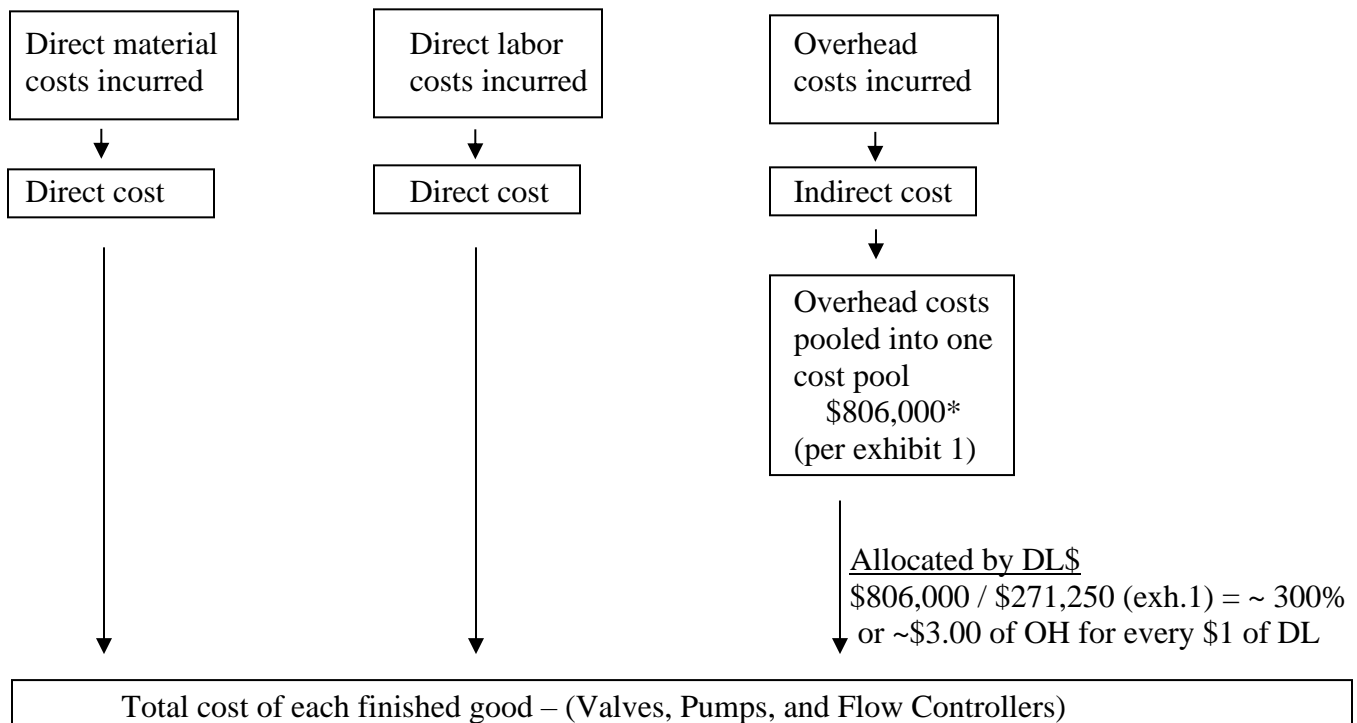
Calculate the Overhead Rate (also called the Allocation Rate) for each cost pool:

Compute the indirect (overhead) costs allocated to the products (or services):

### Wilkerson Case Background

- Wilkerson operates in a mature market, with limited opportunities for innovation, & declining profits.
- Wilkerson has three products: valves, pumps, and flow controllers.
- Ms. Parker, president, has been baffled by the pricing situation Wilkerson faces in the marketplace.
  - a. for one product line, pumps, Wilkerson encounters severe price pressure and discounting while...
  - b. in another product line, flow controllers, Wilkerson has been able to raise prices and increase profits without competitive reaction.
- Despite a homogeneous production process and only three product lines, Wilkerson still has considerable diversity among its products:
  - a. Valves and pumps are high-volume, standard commodity type products
  - b. Flow controllers are lower-volume, more customized and specialized products that require more engineering time and smaller production runs.
- Wilkerson has been experiencing increasing OH costs. Currently the OH rate based on DL\$ is 300%.

### How does Wilkerson's existing cost system work?



\*3rd paragraph on page 2 of the case states "Wilkerson's variable costs were only its direct material and direct labor costs". In other words, all \$806,000 of their overhead is fixed.

*Let's reproduce Exhibit 2 in the case...*

	<u>Valves</u>	<u>Pumps</u>	<u>Flow Controllers</u>
Direct labor cost	\$10.00	\$12.50	\$10.00
Direct material cost	<u>\$16.00</u>	<u>\$20.00</u>	<u>\$22.00</u>
Total direct costs	\$26.00	\$32.50	\$32.00
Manufacturing Overhead (300% of DL\$)			
Total unit costs			
Target/Planned selling price	\$86.15	\$107.69	\$95.38
Planned gross margin % [(Sales \$ - unit cost) / Sales \$]			
Actual selling price	\$86.00	\$87.00	\$105.00
Actual gross margin percentage			

### What is an activity-based costing (ABC) system?

A costing system that focuses on activities and allocates indirect costs on the basis of the activities needed to produce each product or service.

ABC systems involve 3 steps:

Step 1 – All indirect or capacity costs of an organization are put into groups (called cost pools or activity pools). Similar costs (ex. shipping costs, cleaning costs, set-up costs, etc.) are put in the same activity pool.

In other words, Step 1 is make your numerators for each cost pool or allocation rate.

Step 2 – After the cost/activity pools are made, the company identifies the cost-allocation base for allocating each activity pool.

In other words, Step 2 is choose the best denominator for each numerator!

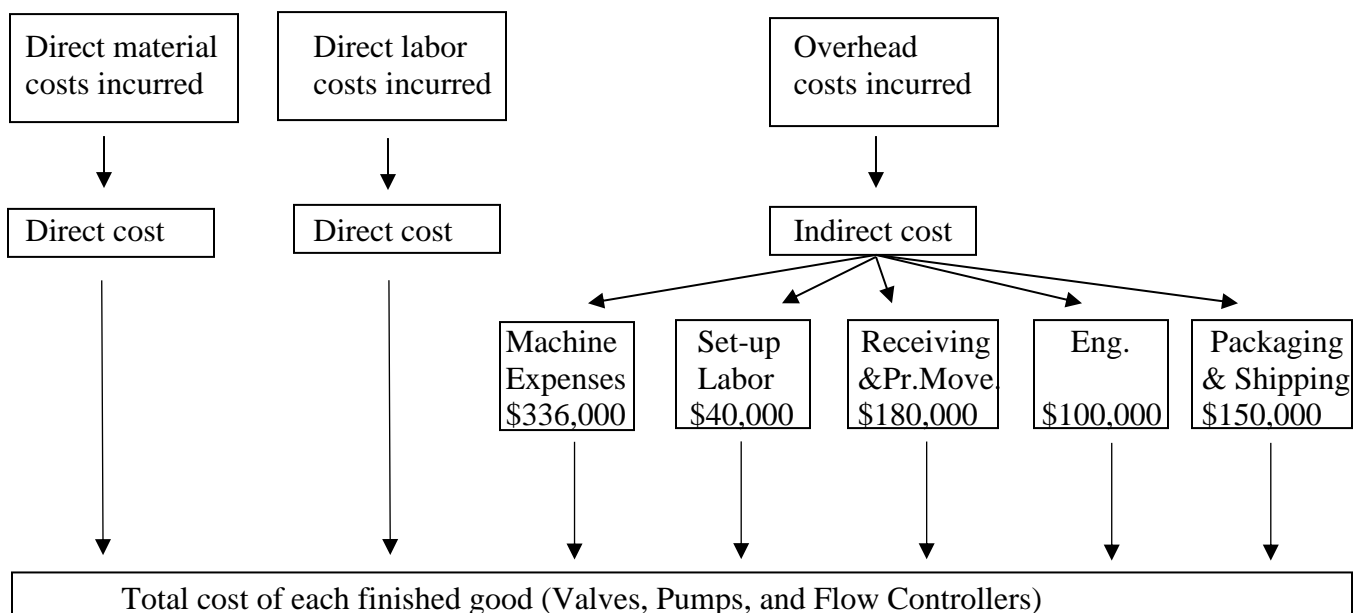
Step 3 – Calculate!

Visually....

Activity-Based-Costing System = Indirect Costs → Activities\* → Products\*/Services\*

\*the activities for Wilkerson, who makes products, are listed below. The activities for a hospital for knee replacement surgery are prepping the patient for surgery, the operation, post-op physical therapy, etc. Everything in this case applies to manufacturers, merchandisers, and service companies!!

### What would an activity-based costing (ABC) system for Wilkerson look like?



Here is Exhibit 3 from the case reproduced for you...

<b><u>Product Data</u></b>	<b><u>Valves</u></b>	<b><u>Pumps</u></b>	<b><u>Flow Controllers</u></b>
Materials cost per unit	\$16	\$20	\$22
Machine hours per unit	0.5	0.5	0.3
Direct labor hours per unit	0.40	0.50	0.40
Direct labor \$/unit at \$25 per DL hour (includes employee benefits)	\$10	\$12.50	\$10

Here is Exhibit 4 from the case reproduced for you...

**Monthly Production and Operating Statistics (March 2010)**

	<b><u>Valves</u></b>	<b><u>Pumps</u></b>	<b><u>Flow Controllers</u></b>	<b><u>Total</u></b>
Production (units)	7,500	12,500	4,000	24,000
Machine hours	3,750	6,250	1,200	11,200
Production runs	10	50	100	160
Number of shipments	10	70	220	300
Hours of engineering work	250	375	625	1,250
Employees whose last name starts with the letter J	4	6	5	15

“Knight’s team had collected the data above based on operations in March 2010. The team felt that this month was typical of ongoing operations. Some people recalled, however, that when demand was really heavy last year, the machines had worked 12,000 hours in a month and the factory handled up to 180 production runs, 400 shipments, and 1,250 hours of engineering work without experiencing any production delays or use of overtime.”

Here is what the task force study of Wilkerson’s overhead costs revealed (the below is copied directly from the bottom of page 2 of the case):

“Knight had recently led a small task force to study Wilkerson’s overhead costs since they had now become much larger than the direct labor expenses. The study had revealed the following information:

1. Workers often operated several of the machines simultaneously once they were set up. For other operations, however, workers could operate only one machine. Thus machine-related expenses might relate more to the machine hours of a product than to its production-run labor hours.
2. A set-up had to be performed each time a batch of components had to be machined in a production run. Each component in a product required a separate production run to machine the raw materials or purchased part to the specifications for the product.
3. People in the receiving and production control departments ordered, processed, inspected, and moved each batch of components for a production run. This work required about the same amount of time whether the components were for a long or a short production run, or whether the components were expensive or inexpensive.
4. The work in the packaging and shipping area had increased during the past couple of years as Wilkerson increased the number of customers it served. Each time products were packaged and shipped, about the same amount of work was required, regardless of the number of items in the shipment.”

**Given all the above information, calculate the costs of Wilkerson's three products using an ABC system**

	Activity-Allocation <u>Rates</u>	<u>Valves</u>	<u>Pumps</u>	<u>Flow Controllers</u>	<u>Unused Capacity</u>	<u>Total</u>
Direct Materials		\$120,000 (\$16)(7500)	\$250,000 (\$20)(12,500)			(ties with exhibit 1)
Direct Labor		\$75,000 (\$10)(7500)		\$40,000 (\$10)(4,000)		(ties with exhibit 1)

**Indirect Costs**

Machine Expenses

Set-up Labor

Receiving & Prod.Move.

Engineering

Pack. & Shipping

**Activity-Based-Costing Totals**

Total Costs (DM + DL + Indirect Costs)

Note – in Wilkerson all indirect costs are fixed (3rd paragraph on page 2). So, for Wilkerson, “unused capacity” is wasted.

**Now let's convert the previous page to per unit numbers**

	<u>Valves</u>	<u>Pumps</u>	<u>Flow Controllers</u>
Direct Materials	\$16 (Exhibit 3)	\$20 (Exhibit 3)	\$22 (Exhibit 3)
Direct Labor	\$10 (Exhibit 3)	\$12.50 (Exhibit 3)	\$10 (Exhibit 3)
<u>Indirect Costs</u>			
Machine Expenses	\$14.00 (\$105,000/7,500)	\$14.00 (\$175,000/12,500)	
Set-up Labor	\$0.30 (\$2,222/7,500)		
Receiving & Product Movement	\$1.33 (\$10,000/7,500)		
Engineering			
Packaging & Shipping			

Total Indirect Costs

Total Costs

Note - If you incorrectly rolled in (aka included) unused capacity you would get the following total costs per unit:

\$46.17                      \$58.20                      \$115.38

Your unused capacity is potentially a true cost but you need to deal with it separately! Do **NOT** include it in (aka roll it into, hide it in) the cost of your product or service. **Leaders** need to manage unused capacity, it is not up to your sales team to try and pass along the unused capacity in higher prices to your customers.

Actual selling price	\$86.00	\$87.00	\$105.00
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Actual Margin (Sales \$ - unit cost)

Actual gross margin percentage  
(Margin from line above / sales \$)

What was the actual gross margin percentages under the old costing system (see p. 2 of these notes)?

34.9%                      19.5%                      41%



## **What does the ABC product cost and profit calculations reveal?**

- Valves are actually....

- Pumps are right at Wilkerson's planned gross margin percentage (listed on page 2 of these notes). Wilkerson executives made the right decision to match competitors' prices.

- Flow controllers, previously thought to be the most profitable product line....

Now Wilkerson executives can understand why competitors did not undercut recent price increases. They were probably scratching their heads (or laughing at them) waiting for Wilkerson to realize that its previous pricing levels failed to cover costs!!!

- Product/Service cost cross-subsidization – if a company under-costs one of its products/services, then it will over-cost at least one of its other products/services and vice versa.

So, this leads to inaccurate and misleading cost data for not just one product/service, but several products/services. Remember, costing is a zero-sum game!

## **Article – You Need a New Cost System When...**

“Profit margins are hard to explain”

“Hard-to-make-products show big profits”

“Competitors' prices are unrealistically low”

“Customers don't mind price increases”

Wilkerson

√

√

√

√

I think this is a great article. I had an Executive MBA student a couple years ago, who was an engineer, tell me after this class he walked into the Controller's office on Monday, handed him this article and walked out.

## **Key Takeaways**

1. Activity-based costing systems focus on activities and allocate costs on the basis of the activities needed to produce each product or service.

2. That is, it helps us:

A. gain a better understanding of the activities performed by our indirect and support resources

B. gain a better sense of how our products, services, and/or customers utilize these activities.

Or in other words...improvement efforts are easier to prioritize and motivate.

3. Armed with this information, we can:

A. make better long horizon decisions regarding profit mix, sales mix, pricing, etc.

AND

B. identify opportunities to achieve activity efficiencies.

Activity-Based-Costing in the real world, from my friend John McGuire...

John was my boss when I was at Hospira. At the time he was the Controller of the Austin plant and I was one of three Senior Financial Analysts at the Austin Plant. John retired from Hospira/Pfizer in 2016, got a little bored and called me to ask if I could help him get a teaching gig at McCombs. Now he is one of my colleagues! When he retired he was the Finance Director for Pfizer's Sterile Injectables Unit overseeing the accounting and finance responsibilities of eight manufacturing sites, \$4B in sales, \$2B in COGS, and 12,000 colleagues.

#### "Hospira (\$5B in sales)

As of 2013, there was no single consistent costing process across the company's global manufacturing operations, mostly because of acquisitions over the years. Some sites absorbed overhead based upon DL hours, other based upon machine/line hours. Some sites developed standard costs based upon full absorption, others based upon full capacity volume, i.e. we carried \$100M+ in unabsorbed manufacturing overhead costs that the Commercial organization had no visibility to.

Lastly, there was not a consistent approach in using ABC drivers for allocating support or service department (Engineering, Quality, Supply Chain, etc.) overhead costs to manufacturing departments and production lines. Product pricing (cost plus) was mostly set on standard margin targets, and yet significant costs weren't included in products, and there was no consistency in how product costs were set.

Executive management (CEO, CFO) wanted to know what the real costs were for the products produced, and then wanted a subsequent review of product pricing to maximize profit margins. Once we provided the revised ABC costs, a decision was made to postpone adopting those new standard costs for a year so that the Commercial organization could digest the new information and formulate a pricing strategy for upcoming contract renewals. Prices and standard costs were subsequently revised in 2014, increasing overall profit margins > 15%. This made Hospira a more attractive acquisition target, and Pfizer purchased them in Q3 of 2015. The CEO and CFO received golden parachutes of \$80M and \$36M, respectively!

#### Pfizer (\$53B in sales)

After the acquisition of Hospira in 2015, Pfizer directed that Hospira manufacturing sites adopt their rigid template for ABC product costing. While one could argue whether that template was the most accurate, Pfizer was more interested in consistency (rather than accuracy) in setting standard costs. This was because they had redundant and excess manufacturing capabilities across the globe and were more interested in sourcing products from the lowest cost manufacturing site, where feasible.

The ex-Hospira manufacturing sites adopted the Pfizer ABC costing methodology for their 2017 standard costs. As a result, significant sourcing changes have been made or are in progress. Also, some higher cost manufacturing sites have either been closed or have had portions decommissioned."