



Job Costing Systems

Costing is a very interesting area because there are many different ways to come up with cost for something. But these principles are generally applicable across the board. Because at any point once you figure out what the cost object is you can come up with a methodology to come up with a cost for that object. Now, what do we mean by a cost object? It's anything you are trying to cost out, anything you are trying to find the cost of. Could be a product, a plant, a geographic area (servicing), and customer profitability. It is something which you are attempting to find the cost for.

In reality there are **Direct Cost** such as **Direct Material** and **Direct Labor**. With **Direct Material** we have a worker who punches in to time clock and designates both his employee number and the job he is working on. As a result charges to the particular job are made through time distribution. The computer will actually cost out his time and charge it to that particular job and this becomes an accounting for the direct labor for this particular job.

The employee goes to the shop floor and looks at the specs for the particular job. He finds that he needs certain material. He fills out a requisition and sends it to the raw materials warehouse. The warehouse gets the requisition and ships the material to the shop floor so the employee may begin the task. In the process they account what is known as **Job Cost** for **Direct Material**.

So now we have accounting for **Direct Material** and **Direct labor**. Looks pretty easy. If there are any other direct cost and if there system allows for other direct cost, they are also clearly identified with that particular job and they must have a mechanism for charging it to that job so that their system can accumulate all of the job costs.

The problem is **Overhead**. How much lighting expended for that job? How much property tax did we expend for that job? How much insurance paid for that job? These costs are all common for all the jobs and cannot be specifically identified with that particular cost object. That whole group of cost is considered **Factory Overhead** which is all other factory costs.

We must find a mechanism to attribute all of the factory costs to the cost object. We will learn this semester that there are many ways to do this. We will start with the most basic way, **The Traditional Method** of allocating overhead to our cost objects. Later we will build on this.

The Traditional Method

$$\text{Overhead (all other factory costs)} = \frac{\text{Budgeted Overhead Costs}}{\text{Allocated Base (Driver)}}$$

Take our budgeted overhead costs and divide it by some **Allocation Base** or **Driver**. Why do we use budgeted? Well we are not really going to know what the true overhead cost is until the end of the year. In the mean time we must properly allocate overhead costs to jobs we are working on. What we do is make a projection for the whole year of all that stuff and that is our **Budgeted Overhead Costs**. Now we take this budgeted overhead cost in total and divide it by an Allocation Base, whatever that base may be. It could be direct labor hours, could be direct labor dollars, machine hours, direct material dollars, could be a lot of things. But the key is we choose one. Then we say that all of the projects I'm doing have this common thread through each of them. For instance, they all have direct labor dollars because the job can't get done unless some direct laborer does the job. So all of the projects, A, B, and C, all have direct labor and direct material and we are trying to find out what is a reasonable overhead allocation.

Well let's say that our budgeted overhead cost for the year was \$500,000 and we chose direct labor dollars for an allocation base and that amount was \$250,000 for the year. This gives us:

$$\text{Predetermined Overhead Rate} = \frac{\text{Budgeted Overhead Costs}}{\text{Allocated Base (Driver)}} = \frac{\$ 500,000}{\$ 250,000} = 200\% \text{ of D/L \$}$$

We have now come up with a factor called a Predetermined Overhead Rate that we can apply to all of our jobs to apportion our overhead expense as we go along during the year (this is still an estimate).

Traditional Model for Costing

	A	B	C
D/L	\$ 25,000	\$ 15,000	\$ 20,000
D/M	\$ 50,000	\$ 75,000	\$ 30,000
O/H	\$ 50,000	\$ 30,000	\$ 40,000
T.P.C.	<u>\$ 125,000</u>	<u>\$ 120,000</u>	<u>\$ 90,000</u>
Units	100	1,000	450
cost/unit	<u>\$ 1,250</u>	<u>\$ 120</u>	<u>\$ 200</u>

Notice that in the above figure we have used the Predetermined Overhead Rate of 200% Direct Labor Dollars calculated above to find the O/H charges for each of the projects.

$$\text{A: } \$25,000 \times 200\% = \$50,000$$

$$\text{B: } \$15,000 \times 200\% = \$30,000$$

$$C: \$20,000 \times 200\% = \$40,000$$

T.P.C.: Total Product Cost

What we now have is a total for the product cost of making each one of these 3 cost objects. Now divide by unit to find cost per unit.

What is Driver? Well it is assumed that the labor activity is driving the creation of the overhead costs. That's the theory, you want to allocate your overhead over some allocation base that is really related to the creation of those overhead costs. If you didn't have people you probably would not incur a lot of the traditional overhead costs.

If this were a machine shop the driver might have been machine hours because that what is driving the cost, the level of machine activity.

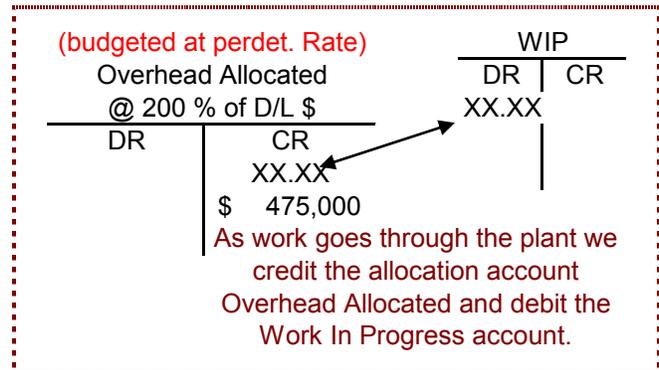
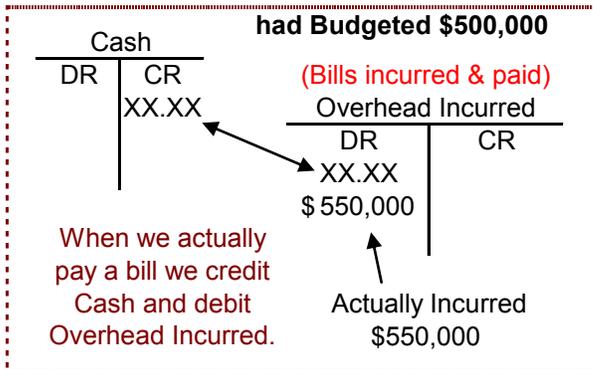
These are the most common in a traditional costing system; work labor hours, work labor dollars, machine hours.

Predetermined Overhead Rate

What is the problem with the Predetermined Overhead Rate? It could be off, wrong, inaccurate! Predetermined means that you determined it in advance of reality. As a result it is essential to come back and revisit the assumptions you made prior.

The predetermined overhead rate is made at the beginning of the year, on January 1. At the end of the year on December 31 you must decide what the **variances** are. So you have two T accounts, **Overhead Incurred** and **Overhead Allocated** (or **Applied**, they are the same). Now when we pay our bills and credit cash or other accounts we debit Overhead Incurred. **Those are our actual overhead costs that we really paid for**. On the other hand, Overhead Allocated is what we applied at 200% of direct labor dollars (budgeted) (in the above example).

What we did was we debited Work in Process and we credited Overhead Allocated. Now there is a difference. Lets say that our budgeted overhead costs were \$500,000, that's what we budgeted at the beginning of the year on January 1. Problem is we actually wrote checks for \$550,000. Also, all the direct labor overhead cost we though would come in did not come in. We did not incur some of the overhead cost we thought we would. So we apply the 200% to the direct labor that did come in and we find that we only incurred \$475,000 instead of the \$500,000 we budgeted.



$$\text{Solve for Actual D/L @ 200\%} = \frac{475000}{200.00\%} = \$237,500$$

200% of direct labor dollars of \$237,500 are actual direct labor dollars of \$475,000. We applied that rate as the year went on. And when we applied it it meant that we allocated \$475,000 to our products. The problem now is that we have an imbalance. The reason we did the budget overhead costs was because we thought we were going to allocate everything that we incurred. But the reality was that we incurred \$550,000 but only allocated \$475,000.

This condition is called **Under Allocated by \$75,000** = \$550,000 - \$475,000.

EXAM

Not enough to say under or over allocated, must list the amount as well.

In this case, where we are under allocated, it means the product did not have enough costs attached to them as the year went on. There are two ways of handling this.

Over / Under Allocated Resolutions

- 1) Write it off to Cost of Goods Sold. In this case we would basically give a credit to the overhead allocated account and debit COGS.
- 2) We could Pro-Rate it to Cost of Goods Sold, Finished Goods, and Work in Process. Three accounts but not the three inventory accounts because raw materials never got any overhead. Homework problem 5-20 sheds more light on this. The key points are:
 - 1) Derive an O/H prediction based on a predetermined rate and driver.

- 2) Collect your actual incurred values for the year. How much O/H and how much of the driver units actually went through the shop.
- 3) Use the actual driver units which went through the system using the predetermined rate percentage. This is the amount of O/H you can allocate for the year.
- 4) Now compare actual year end O/h to O/H calculated based on driver. You will find that the driver either over or under allocated the amount of O/H.
- 5) Dispose of the over or under allocated amount properly by crediting the O/H allocated account and debit COGS or pro-rate the inventory accounts (but not raw materials)(see above).

EXAM

We will be asked specific questions about how we determine if we are over or under applied and how much are we over or under applied by and what do we do to dispose of the over / under application?

Now, going back to the question of overhead.

Factory		
D/L	D/M	O/H
Overhaed is a HUGE percentage		

What is the problem with the Traditional Method? The problem is that overhead is way too big to be spreading across all the products without specify on how much of the overhead resource one product used versus another product. Depending on direct labor dollars as an indicator is not necessarily a good practice. Look at B above for example. It has only \$15,000 in direct labor but used up \$75,000 worth of material. People had to order that material, handle that material, warehouse that material, ship it to the shop floor, process it in the shop. So why should one job get less overhead charge than another job which may have had less material but had \$40,000 overhead charge? This demonstrates how there can be an anomaly between what we allocate based on the single driver and what in fact is the reality of how much overhead services one product versus another product.

So accountants decided that they needed to come up with a better model.

Remember the factory. There have been reversing trends in the accounting world. It use to be that accounts use to define direct labor so narrowly that it only included straight time wage for the laborer actually working on the project. Didn't include his fringe benefits, didn't include his sick time, down time, vacation time, 401K, and other things. Then they would do the same thing with direct material, only the material which is incorporated into the final product but has to be traceable to the final product. For example, the laminate on top of the desk is a direct material, it is traced to the final product. But it requires a bucket of glue to put the laminate on. Well the bucket of glue is maybe \$1.50. Why spend \$10 worth of time tracing a bucket of glue? But the

same is true for sand paper, \$0.50 for a whole box. So there are some direct materials they are not tracing even though those materials could be incorporated into the final product.

So the accountants very narrowly defined direct material as only being that which is traceable to the final product as well as being incorporated into the final product. What did that leave? It left a BIG HUGE GLOB called OVERHEAD.

Whenever companies talk about reducing costs they always point to overhead first. It's so big, if they can only reduce it 10% it would be substantial. But how do you attack it? What do you look at first?

In the last decade accounts have been working on this problem. What they have come up with is a way to look at the "blob" and take some of it and find a way to charge it out more directly to the job.

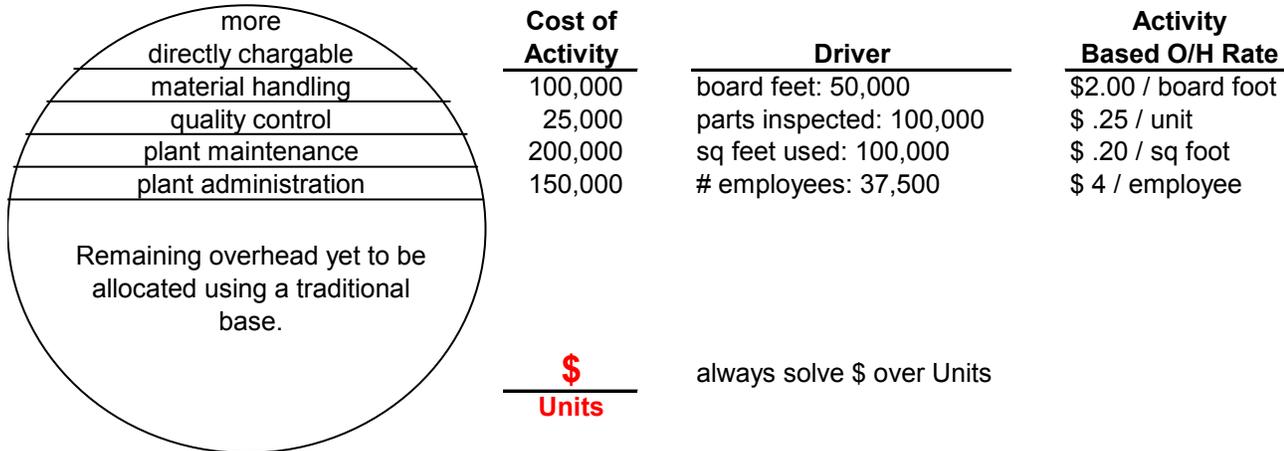
Things which are closely associated with the job can be more directly chargeable. Instead of going into the overhead pool they can be spiked out and more directly chargeable to the job.

Then they said, what are we doing in this overhead blob? What services are going on in there? They found out that they have an entire group that just handles materials. And another group that's doing quality control. And another doing plant maintenance. And a group doing plant administration. They specifically handle the plant personnel.

Next they called these items Overhead Activities and found out what the cost is of each activity and came up with a driver which is closely associated with that activity and in doing so they are able to come up with a predetermined overhead rate for that activity and they called it **Activity Based Overhead Rate**.

Activity Based Overhead Rate

Overhead Activities as huge blob



Now we have a way of dealing with these large overhead numbers. We now have divided up our costs into activity areas. We know what the cost of each activity is and we know what the productivity driver is for each activity. And therefore in a single number we have cost and activity or productivity parameter. In a single number we can equate the two. Now we can either manage the cost of that activity or manage the productivity of that activity and thereby improve our single number which equates the cost and productivity. By so doing we not only are able to come examine direct labor and direct material but then have newly identified direct as a new direct cost category (and this is not limited to one, may have many newly identified direct items). Then, on our activity based overhead, we can now look at that job and be more specific about each charge and how much the job incurred. Now we are being very specific about the true cost of a project. Not only do we have direct labor and direct material but also whatever is truly identifiable with the project directly I'm now able to charge to that project more directly and whatever they used in the way of overhead resources we can also charge more directly to that project on the basis of a more reasonable allocation rate which is specific to that particular resource. This is allowing us to be a lot more accurate with our cost and overhead allocation. So the big blob is widdled down though there may still be a piece of remaining overhead yet to be allocated. These yet to be allocated costs would be allocated using the traditional method and a traditional base. These are the unattributeable overhead costs, or general overhead.

Every quarter the company should look at what has occurred for the first quarter of the year and then make a new projection for the last 3 quarters considering what has already occurred. This allows adjustments as you go so that there is no "4th Quarter Surprise" of a negative nature. If your costing policy is off you will have to account for it somewhere and that will be a completely unplanned expense. So each quarter has it's own cost rate. These get applied to the LIFO, FIFO and Weighted Average inventory methods.

Activity Based Costing

D/L	\$ 50,000
D/M	\$ 27,000
Newly Identified Direct	\$ 32,000
<u>Overhead (Activity Based)</u>	
material handling	\$ 20,000
quality control	\$ 14,500
plant maintenance	\$ 12,000
plant administration	\$ 6,000
other O/H	\$ 5,000
TPC (Total Product Cost)	<u>\$166,500</u>

Activity Based Management is an offshoot of activity based costing. Activity Based Costing is computing the numbers and costing out the product, activity based management is then using the information that activity based costing gives you to manage the overhead pool and manage the business. There is another group of activities called **Activity Based Strategies** (strategic planning). In this area the managers consider alternative forms of accomplishing activities and look for possibilities to increase savings. This includes outsourcing a particular activity.

Service Sector Costing

We will go over one service sector model now and examine another type when we discuss the homework.

Say we are a large consulting firm consulting internally and our costs are broken down into **Direct Costs** and **Supporting Costs**. My direct professional labor are the professionals actually sent out to be the lead persons on the project and we have a lot of indirect support cost. Say that our direct labor is \$10,000,000 and we have \$20,000,000 of supporting cost. Now say we want to come up with a 20% profit on the operating income entry. We want 20% profit! How do we go about this?

Direct Project Labor	\$	10
Indirect Support Costs	\$	20
Total Costs	\$	<u>30</u>

First we must figure out a target revenue to support that. Do this by looking at the total costs, in this case \$30,000,000 and dividing it by 1 – Profit Percentage.

$$\text{Target Revenue} = \frac{\text{Total Costs}}{1 - \text{Profit \%}} = \frac{30}{1 - .2} = \$ 37.5$$

That's what we will need in order to get the 20% profit on the bottom line. (Here we consider only operating income. Not considering taxes or other operating expenses.)

Target Revenue	\$	37.5
Direct Project Labor	\$	10
Indirect Support Costs	\$	20
Total Costs	\$	<u>30</u>
Operating Income @ 20 %	\$	<u>7.5</u>

The second question is that we have budgeted for the year, but the reality of it is I now need to know how to cost and price the jobs and bids. When the company bids the only way it is going to get the desired profit margin is if it bids correctly.

First we must know what our **Indirect Cost Rate** is. We will solve for this as a percent of direct costs.

$$\text{Indirect Cost Rate} = \frac{\text{Indirect Costs}}{\text{Direct Costs}} = \frac{20}{10} = 200\% \text{ of direct costs}$$

Now if we know the direct cost of a job we know how to cost the indirect costs based on our **Indirect Cost Rate** (Overhead Costs) of 200%.

But we still do not know how to price the job so we will have to come up with a **Mark Up Rate**. There are two ways to do this.

Mark Up Rate

$$1) \text{ As \% of Direct Costs} = \frac{\text{Target Revenue}}{\text{Direct Costs}} = \frac{37.5}{10} = 375\% \text{ of Direct Costs}$$

$$2) \text{ As \% of Total Costs} = \frac{\text{Target Revenue}}{\text{Total Costs}} = \frac{37.5}{30} = 125\% \text{ of Total Costs}$$

EXAM

Must state what it is a percent of.

Example

What to bid for a specific job using our derived ratios. We will use the Indirect Cost Rate of 200% of Direct Costs. We decide that the Direct Professional Labor for this job will be \$5,000. This leads directly to Indirect Cost @ 200% of Direct Labor = \$5,000 * 2 = \$10,000. We now have a Total Cost of \$15,000. We now have two ways of arriving at the Bid Price. Either take 375% of Direct Costs or take 125% of 15,000. Both will give the same solution for Bid Price of \$18,750.

Continuing Mark Up Rate Discussion

Bid Price	\$ 18,750	
Direct Professional Labor	\$ 5,000	(375% of Direct Cost)
Indirect Costs @ 200%	\$ 10,000	
Total Costs	\$ 15,000	(125% of Total Cost)
Operating Income	\$ 3,750	

$$(\text{Bid Price} = 5000 * 3.75 = 15000 * 1.25 = \$18,750)$$

The above is a **Costing and Pricing Model** for a **Services Firm**. Lawyers, accounts, consultants, etc can use this type of model.

Homework

Ch 4 pb 4-20, 4-21 pg 128

Ch 5 pb 5-28, 5-29, 5-38 pg 128

DO NOT CREATE THE OVERVIEW DIAGRAM, NEVER HAVE TO CREATE AN OVERVIEW DIAGRAM IN THIS COURSE

These all have **modifications!**

4-20

Company has 2 departments, machining and assembly. Both have overhead. Come up with a predetermined overhead rates for each department. They use different drivers!

They give us the cost record for job 494, it went through both departments. Computer total PRODUCT (**modification**) cost for this job, not just the overhead.

In #3 they point out that the actual O/H for the year was different so we should determine if it was under/over allocated. remember that our overhead was applied all year long based on the predetermined rate. So we must come up with, based on the predetermined rate of #1, how much they might apply based on the actual units of driver that went through the system then compare that to the actual overhead which was incurred.

4-21

Consulting firm, it has a budget for the year and project 10% profit on bottom line, have projected what the target revenue is. Computer the budgeted indirect cost rate.

For #2 and #3 come up with a target revenue assuming they wanted a 20% profit margin. Computer both, percent of direct costs and percent of direct costs. Also, base it on a 20% profit revenue stream (in addition). First must come up with a target revenue assuming 20% profit margin. second, what would the mark up rate be if the target profit percent were 20%.

In #3 find what the bid should be if 20% is required.

5-28, 29 (same problem)

Law firm has two clients, they are losing a client because of their costing method. In 5-28 they tell us how many hours are being devoted to each costs. Come up with the direct and indirect costs for each client, sum the two and come up with the total cost. Rates are given.

In 5-29 we break out O/H into distinct pools. In this case of the total O/H they broke down \$14,000 into more directly chargeable pools. But there is another \$7,000 O/H cost which they could not break down. This must be allocated using direct labor hours from the preceding problem as \$104 and \$96. Total of \$200. Now \$7,000 of remaining direct costs divided by the 200 hours to come up with an overhead rate to attribute to each client individually.

5-38

Activity Based Costing problem. Have 5 areas. Rate and allocation base given. We know that that rate should be applied to each job depending on how much resource that job used. We will see that the jobs used different kinds of resources in getting completed.

Compute the manufacturing costs for each job under the previous method (straight allocation) then compute manufacturing costs per unit using activity based costing.