



**maxim**

CONSULTING GROUP

**Job Cost & Shop  
Burden**

**SMACNA 2019**



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## **JOB COST MANAGEMENT**

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### **OBJECTIVES**

- Discover the methodology behind a schedule of values
- Understand the importance of earned hours
- Discuss the importance of accurate project accounting
- View tools that make labor forecasting easy

### **CONTRACTORS DO THREE THINGS...**

#### **Acquire Projects (Get Work)**

- Marketing, Business Development, Estimating, Sales

#### **Execute Work (Do Work)**

- Operations (Field and Project Management)

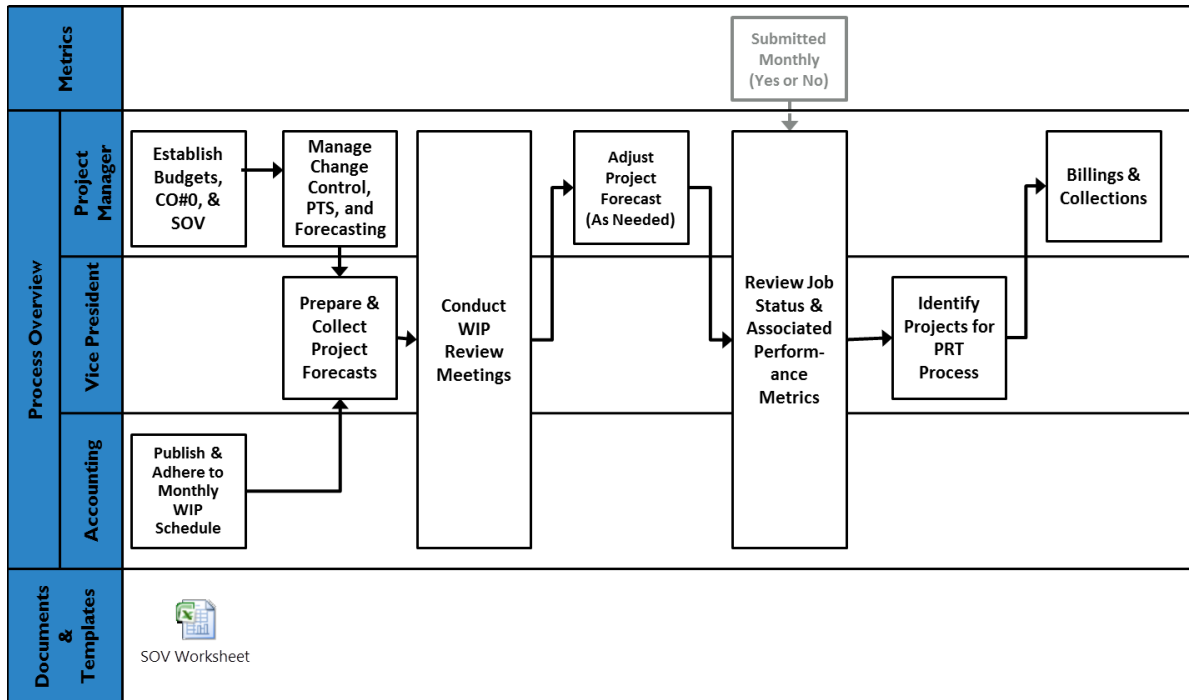
#### **Measure Work (Keep Score)**

- Accounting, Finance departments

### **WHY IS JOB COST FEEDBACK IMPORTANT?**

- Everyone has the need to “light up the scoreboard”
- If your players don’t know the score of the game, how can they be expected to win?
- You can’t manage what you don’t measure
- Good feedback improves the quality of information being put into the system

## CORPORATE WIP PROCESS – OVERVIEW



## SCHEDULE OF VALUES DISCUSSION

- What is a schedule of values?
- What is it used for?
- How do you calculate yours?
- Is it the same as your budget?
- Is revenue the same as profit?
- How long does it take to get paid?
- Do you front load?
  - By how much?
  - Is it ethical?
  - Is it practical?

## TRADITIONAL METHOD FOR DETERMINING PERCENT COMPLETE

Example of Cost Summary:

Projected cost	\$1,000,000	% Complete = _____
Job to date cost	\$500,000	

## PERCENT COMPLETE BASED ON LABOR

### Projected Cost:

Labor	\$550,000
Material	\$260,000
Equip.	\$125,000
Subs	\$65,000
Total Cost	\$1,000,000

### Job to Date Cost:

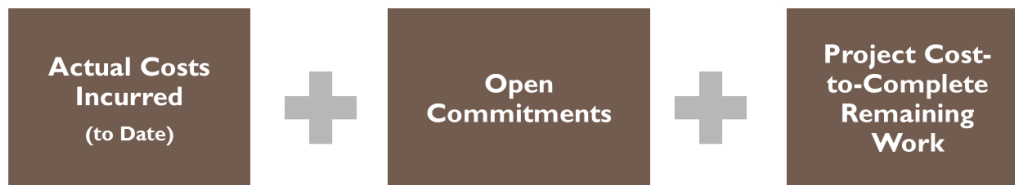
Labor	\$190,000
Material	\$200,000
Equip.	\$45,000
Subs	\$65,000
Total Cost	\$500,000

% Complete Based on

Labor = \_\_\_\_\_

## RECOMMENDED METHOD TO DETERMINE PERCENT COMPLETE

The “Cost-to-Complete” method is an accurate way to determine percent complete computed as follows:



## WHY ACCURATE FIELD REPORTING IS IMPORTANT

	Estimated Hours	Actual Hours	Reported Hours
<b>Job 1:</b>			
– Activity A	100	90	100
– Activity B	100	110	100
	<hr/> 200	<hr/> 200	<hr/> 200
<b>Job 2:</b>			
– Activity A	100	90	100
– Activity B	1000	1100	1090
	<hr/> 1100	<hr/> 1190	<hr/> 1190

## REPORTING BOTH QUANTITIES AND ASSOCIATED HOURS

Estimated Labor	Actual Labor	Variance	Projected Labor
\$10,000	\$5,000	\$5,000	\$ ?

How is this job performing? What is the projected labor?

Estimated Units	Act. Installed Units	Est. Labor \$	Act. Labor \$	Projected Labor
100	25	\$10,000	\$5,000	\$?

How is this job performing? What is the projected labor?

## EARNED VALUE – THE INDUSTRY STANDARD

- Practical way to provide feedback
- Single productivity metric for:
  - One Activity
  - Group of Activities
  - Job
  - Group of Jobs
  - Division
  - Total Company
- Adds objectivity to your cost to complete projections

## USING EARNED VALUE

### From the Budget:

- Estimated units or quantities for key items in the budget
- Estimated man-hours for each item in the budget

### From the Field:

- Installed units or quantities for key items in the budget
- Percent complete for all other items in the budget
- Actual man-hours for each item in the budget

### EARNED VALUE EXAMPLE

A	B	C	D	E	F	G	H	I	J	K	L
BUDGETED				ACTUAL				PRODUCTIVITY PROJECTED			
Activity	Units	UOM	Hours	Units	UOM	% Comp.	Earned Hrs.	Act. Hours	Earned/Actual	Hours	
A	1000	LF	800	300	LF	30.00%	240	275	87.27%	917.00	
B	5000	SQ FT	1500	2500	SQ FT	50.00%	750	675	111.11%	1350.00	
C	500	EA	550	100	EA	20.00%	110	80	137.50%	400.00	
D	1	LS	150	80.00%	LS	80.00%	120	120	100.00%	150.00	
<b>TOTAL</b>			<b>3000</b>				<b>1220</b>	<b>1150</b>	<b>106.09%</b>	<b>2817.00</b>	

< 1 = worse than budgeted production  
 > 1 = better than budgeted production

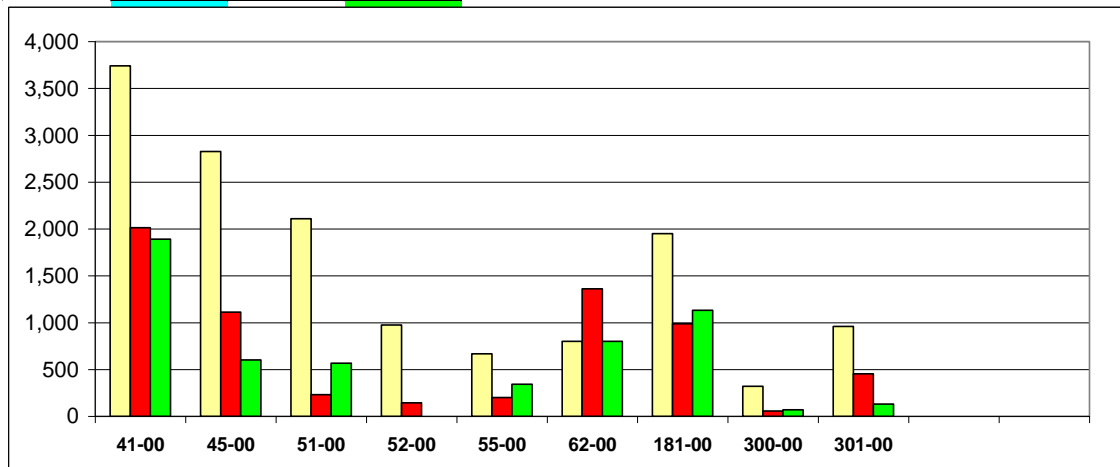
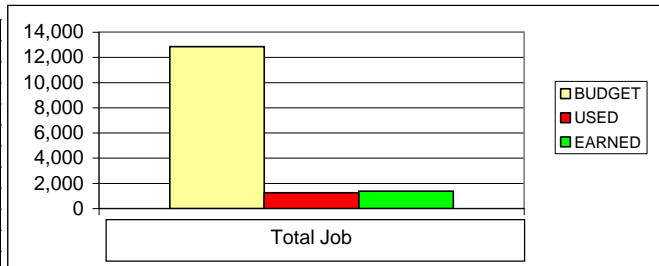
### USER FRIENDLY REPORT FORMATS

#### Labor Feedback Report

Job Name: **Beantown Marketplace**

Week Ending: **12/9/2005**

COST CODE	BUDGET	USED	EARNED
41-00	3,741	2,013	1,890
45-00	2,828	1,112	601
51-00	2,110	232	567
52-00	976	143	0
55-00	667	201	343
62-00	801	1,361	801
181-00	1,950	988	1,132
300-00	320	56	70
301-00	960	453	131
<b>Total Job</b>	<b>12,845</b>	<b>1,256</b>	<b>1,375</b>



### EARNED VALUE WORKSHOP – SCENARIO

- You are the project manager and you are scheduled to meet with your boss to report on the status of your project
- Specifically, he wants a summary of labor productivity to date as well as projected labor hours and labor costs at completion
- You have thoroughly walked the project with the superintendent and are satisfied that the quantities (or percent complete) reported from the field are accurate

### EARNED VALUE WORKSHOP – ASSIGNMENT

- Review the summarized information from the project budget (Exhibit One)
- Review the summarized information from timecards and quantity reports (Exhibit Two)
- Complete the earned value summary report (Exhibit Three)
- Calculate the total labor cost at completion assuming a labor cost of \$50/hour (Exhibit Four)

### EXHIBIT ONE: SUMMARIZED INFORMATION FROM THE PROJECT BUDGET

	<b>Budgeted Man-Hours</b>	<b>Total Quantity</b>	<b>Unit of Measure</b>
<b>Activity A</b>	<b>8,000</b>	<b>100,000</b>	<b>SF</b>
<b>Activity B</b>	<b>6,000</b>	<b>50,000</b>	<b>LF</b>
<b>Activity C</b>	<b>4,000</b>	<b>1,000</b>	<b>EA</b>
<b>Activity D</b>	<b>1,000</b>	<b>1</b>	<b>LS</b>
<b>Activity E</b>	<b>1,000</b>	<b>1</b>	<b>LS</b>
<b>Total</b>	<b>20,000</b>		



**EXHIBIT TWO: SUMMARIZED INFORMATION FROM TIMECARDS AND QUANTITY REPORTS**

	Hours Reported JTD	Units or Percent Installed JTD	Unit of Measure
Activity A	4,000	40,000	SF
Activity B	2,500	25,000	LF
Activity C	2,400	600	EA
Activity D	300	30.00%	LS
Activity E	300	10.00%	LS
<b>Total</b>	<b>9,500</b>		

**EXHIBIT THREE: EARNED VALUE SUMMARY REPORT**

A	B	C	D	E	F	G	H	I	J	K	L
	BUDGETED				ACTUAL				PRODUCTIVITY		PROJECTED
Activity	Units	UOM	Hours		Units	UOM	% Comp.	Earned Hrs.	Act. Hours	Earned/Actual	Hours
A											
B											
C											
D											
E											
<b>TOTAL</b>											

## EXHIBIT FOUR: LABOR COST SUMMARY

Labor cost to date =

\_\_\_\_\_ Hours X \$50 = \$\_\_\_\_\_

Projected labor cost-to-complete remaining work =

\_\_\_\_\_ Hours X \$50 = \$\_\_\_\_\_

Projected labor cost at completion =

\_\_\_\_\_ Hours X \$50 = \$\_\_\_\_\_

## COST AND PROFIT PROJECTION WORKSHOP

### ESTIMATE FOR INDIVIDUAL PROJECT

	Amount	% of Sales
<b>CONTRACT AMOUNT</b>	\$2,000,000	100.00%
<b>DIRECT COSTS</b>		
<b>Labor</b>	800,000	40.00
Materials	800,000	40.00
Subcontractors	50,000	2.50
Equipment	70,000	3.50
Total Direct Costs	\$1,720,000	86.00
<b>GROSS PROFIT</b>	\$280,000	14.00

At the end of the third month ...

- Your job cost report indicates that you have spent:
  - \$475,000 on labor (9,500 hours X \$50/hour)
  - \$492,000 on materials
  - \$ 25,000 on subcontractors
  - \$ 40,000 on equipment
  - \$1,032,000 total (60% of total estimated costs)

- You have billed the customer \$1,000,000
- After verifying installed quantities and percent complete on the various work activities and preparing your earned value summary, you estimate the cost to complete the remaining work to be as follows:
  - \$675,000 on labor (13,500 hours X \$50/hour)
  - \$114,344 on materials
  - \$ 25,000 on subcontractors
  - \$ 30,000 on equipment
  - \$844,344 total

**Assumptions:**  
**No change orders have occurred on this project**  
**This is a lump sum project**

- What percent complete are you to date?  
 Percent Complete: \_\_\_\_\_
- How much revenue and profit have you earned to date?  
 Earned Revenue-to-Date: \_\_\_\_\_  
 Earned Profit-to-Date: \_\_\_\_\_
- Is this project over-billed or under-billed? If so, by how much?  
 Over-billed/Under-billed: \_\_\_\_\_

**Assumptions:**  
**No change orders will occur on the remaining work**  
**This is a lump sum project**

- How much profit do you project that this project will make once completed?  
 Project Profit at Completion: \_\_\_\_\_
- How much profit gain or erosion does this represent when compared to the original estimate?  
 Margin Gain/Erosion: \_\_\_\_\_

- There is only one way to accurately determine percent complete ... You must re-estimate the remaining work on the project

$$\% \text{ Complete} = \frac{\text{Actual Costs to Date}}{(\text{Actual Costs to Date} + \text{Costs to Complete Remaining Work})}$$

- A 5% error in percent complete on a \$2,000,000 project equals a \$100,000 error on the bottom line

## **CRACKING THE “WIP”**

### **Forecasting Made Easy**

- Labor Forecasting Worksheet
- \$ Based Forecasting Worksheet
- Job Status Report

## **JOB COST MANAGEMENT**

If you wait until the end of the game  
To look at the score,  
you probably won't have  
a winning record!

**SELECT ONE JOB COST MANAGEMENT HABIT TO CHANGE**

1. Old habit:

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2. New habit:

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3. Initial steps to implement:

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4. Who will help:

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5. How will they help:

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6. Identify a check-point for yourself to see how you are doing with this new habit:

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## **ESTABLISHING OVERHEAD IN A SHEET METAL BUSINESS**

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### **AGENDA**

- Document and Presentation Structure
- Uniqueness of the Sheet Metal Industry
- Identification and Calculation of Burden Types

### **DOCUMENT AND PRESENTATION STRUCTURE**

- Introduction and Executive Summary
- Overview of Each Burden Type
  - Description of Traditional, Spatial Coordination, Field and Installation Overheads
  - Isolation of Fixed vs Variable Expenses
  - Calculation Options
- Sequence for Establishing Burden
- Summary and Conclusions

### **UNIQUENESS OF SHEET METAL INDUSTRY**

#### **THE SHEET METAL INDUSTRY CHALLENGE**

- Sheet metal/HVAC contractors are unique in that they engineer, manufacture and install products made from raw materials.
- The scope of services provided by sheet metal contracts creates confusion and sometimes conflict with owners
- The purpose of this document is to detail the various types of expenses incurred in support of a proper determination of overhead and burden rates.
- The objective is to provide a clear and concise discussion surrounding the scope of services provided by the Sheet Metal/HVAC Contractor and thus how overhead and burden should be calculated.

## LEAD TIME, OVERHEAD AND BURDEN REQUIREMENTS BY BUSINESS TYPES

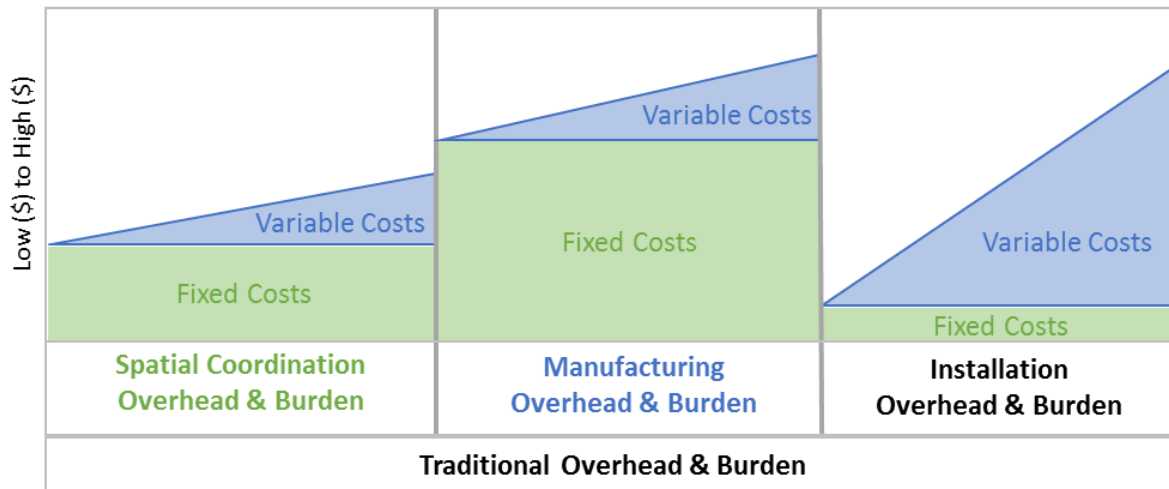
Project ETO Delivery Lead Time						Project Engineer-to-Order
Design	Purchase	Manufacture/ Fab	Assemble	Ship	Installation	
ETO Delivery Lead Time						Engineer-to-Order
Design	Purchase	Manufacture/ Fab	Assemble	Ship		
MTO Delivery Lead Time						Make-to-Order
	Inventory	Manufacture/ Fab	Assemble	Ship		
ATO Delivery Lead Time						Assemble-to-Order
	Manufacture	Inventory	Assemble	Ship		
MTS Delivery Lead Time						Make-to-Stock
	Manufacture	Assemble	Inventory	Ship		

### PROJECT ENGINEER TO ORDER

- The typical HVAC contractor is operating in a project engineer to order capacity
- Building a custom sheet metal project would not be possible without the overhead necessary to support all the functions described in the project engineer to order work flow

## IDENTIFICATION AND CALCULATION OF BURDEN TYPE

### THE ELEMENTS OF OVERHEAD AND BURDEN

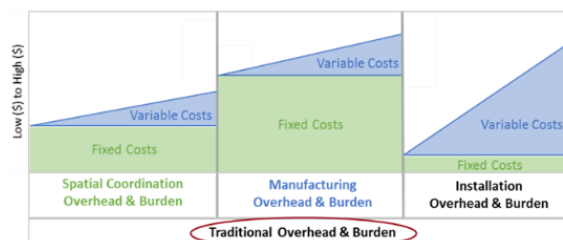


### FIXED vs. VARIABLE COSTS

- Fixed Costs
  - Costs that are incurred regardless of whether a project is detailed, manufactured or installed
- Variable Costs
  - Costs that are incurred as a result of a project being detailed, manufactured or installed
- Specific definitions for each fixed and variable cost are described in detail in the study

### TRADITIONAL OVERHEAD AND BURDEN

- Most owners and GCs understand
  - 10% Overhead Allocation
    - Insurance
    - Utilities
    - Property taxes
    - Etc.
- Traditional overhead is likely less than 10%
- OVERALL overhead and burden encapsulating all services is much higher than 10%





## CALCULATING TRADITIONAL OVERHEAD AND BURDEN

### Fixed Costs

- |                                |                            |
|--------------------------------|----------------------------|
| 1. Depreciation                | 7. Officer Salaries        |
| 2. Dues and Memberships        | 8. Rent                    |
| 3. Estimating Salaries         | 9. Repairs and Maintenance |
| 4. Insurance                   | 10. Utilities              |
| 5. Legal and Professional Fees | 11. Miscellaneous          |
| 6. Accounting Salaries         |                            |

### Variable Costs

- |                       |                               |
|-----------------------|-------------------------------|
| 1. Advertising        | 7. Sales Commissions          |
| 2. Bad Debts          | 8. Travel and Entertainment   |
| 3. Communications     | 9. Unapplied Labor            |
| 4. Employee Benefits  | 10. Unapplied Equipment       |
| 5. Equipment Expenses | 11. Taxes (Payroll and Other) |
| 6. Interest           |                               |

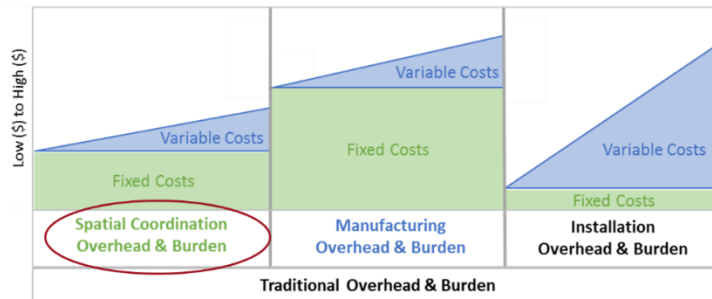
## FORMULA FOR TRADITIONAL OVERHEAD AND BURDEN

$$\text{Traditional Overhead Rate} = \frac{\text{Total Fixed and Variable Budget}}{\text{Total Budgeted Cost}}$$

It is recommended that companies use a ROI based approach to budgeting and using marginal contribution as the basis of establishing the revenue target, the formula is:

$$\text{Revenue Required} = \frac{\text{Fixed Overhead (\$)} + \text{Desired Profit (\$)}}{\text{Gross Profit (\%)}}$$

## SPATIAL COORDINATION OVERHEAD AND BURDEN



- Spatial coordination is a generic term intended to cover engineering, detailing, CAD, BIM, etc.
- Additional overhead and burden are associated with this service beyond traditional overhead and burden

## CALCULATING SPATIAL COORDINATION OVERHEAD AND BURDEN

### Fixed Costs

1. Product Design Costs
2. Spatial Coordination Facility Costs
3. Utilities & Insurance Costs
4. Maintenance Costs

### Variable Costs

1. Design Personnel
2. Detailing and Spatial Coordination Personnel
3. Payroll Taxes, Insurance and Benefits
4. Training

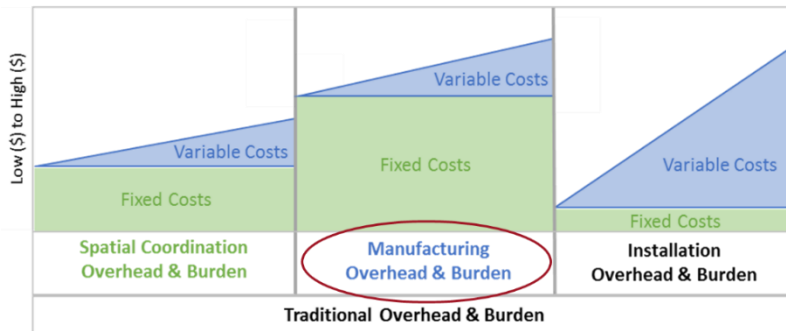
## FORMULA FOR SPATIAL COORDINATION OVERHEAD AND BURDEN

$$\text{Spatial Coordination Burden} = \frac{\text{Total Spatial Coordination Fixed and Variable Costs}}{\text{Total Budgeted Spatial Coordination Labor Hours}}$$

Once the spatial coordination burden rate has been established, a billing multiplier (like an A/E design firm) can be calculated. This billing multiplier is a rate to be used for billing out spatial coordination services.

$$\text{Billing Multiplier} = \frac{\text{Spatial Coordination Burden} + 1}{100\% - \text{Gross Profit Goal \%}}$$

## MANUFACTURING OVERHEAD AND BURDEN



- Manufacturing raw materials and products into finished or semi-finished from within a shop environment
- Highly specialized and expensive equipment with low utilization rates
  - This means the fixed costs must be spread across fewer products
  - Higher burden per piece of product manufactured

## CALCULATING MANUFACTURING OVERHEAD AND BURDEN

### Fixed Costs

1. Fabrication Process Costs
2. Facility Costs
3. Utilities & Insurance Costs
4. Facility Maintenance Costs
5. Equipment Ownership Costs
6. Cost of Capital
7. Miscellaneous Costs

### Variable Costs

1. Field Personnel
2. Procurement
3. Manufacturing Personnel (Shop Labor)
4. Supervisory Personnel
5. Shop Maintenance Personnel
6. Quality Control
7. Safety
8. Logistics
9. Payroll Taxes, Insurance and Benefits
10. Training

## METHOD 1: SCHEDULE BASED METHOD

- Allocate fixed costs based on job duration and direct job charge variable costs

Fixed costs are covered by establishing a daily rate:

$$\text{Allocation of Fixed Shop Cost} = \frac{\text{Total Fixed Costs}}{254 \text{ Working Days}}$$

All the variable costs are direct job costed to the project

## METHOD 2: SHOP LABOR BASED METHOD

- Percentage based formula using shop labor as the denominator

This method ensures the customer pays the burden for the hours worked on their project which is more practical for smaller shops that do many small projects.

$$\text{Burden} = \frac{\text{Total Fixed Costs} + \text{Total Variable Costs}}{\text{Total Shop Labor Hours (or pounds)}}$$

## METHOD 3: FIELD LABOR BASED METHOD

- Percentage based formula using direct labor as the denominator

This approach requires some forecasting. The formula would be as follows:

$$\text{Burden} = \frac{\text{Total Fixed Costs} + \text{Total Variable Costs}}{\text{Total Direct Labor (Field) Hours Charged to Projects}}$$

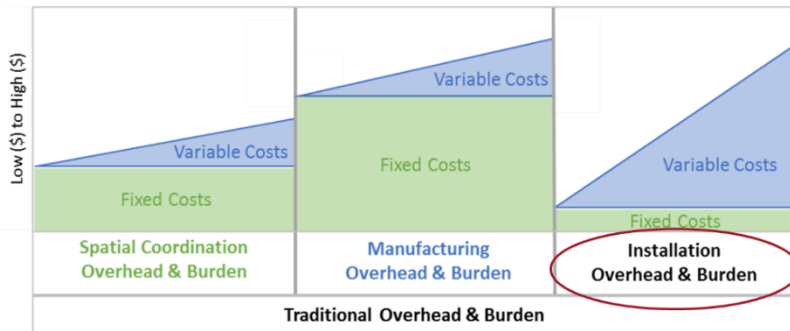
## METHOD 4: DIRECT JOB COST METHOD

- In this method, the burden is allocated based upon the direct job costs.

$$\text{Burden} = \frac{\text{Total Fixed Costs} + \text{Total Variable Costs}}{\text{Projected Direct Job Costs for Labor and Material for the Year}}$$

This method will reduce the overall percentage but is somewhat risky if the composition of the cost of goods sold is variable in a company or revenue may not hit the business plan.

## INSTALLATION OVERHEAD BURDEN



- The installation phase of a project sees the lowest overall fixed cost, but very high variable costs.

## CALCULATING INSTALLATION OVERHEAD AND BURDEN

### Fixed Costs

- Tools and Supplies

### Variable Costs

- Field Personnel
- Supervisory Personnel
- Payroll Taxes, Insurance and Benefits
- Training
- Safety

## CALCULATE BURDEN FOR HOURLY EMPLOYEES

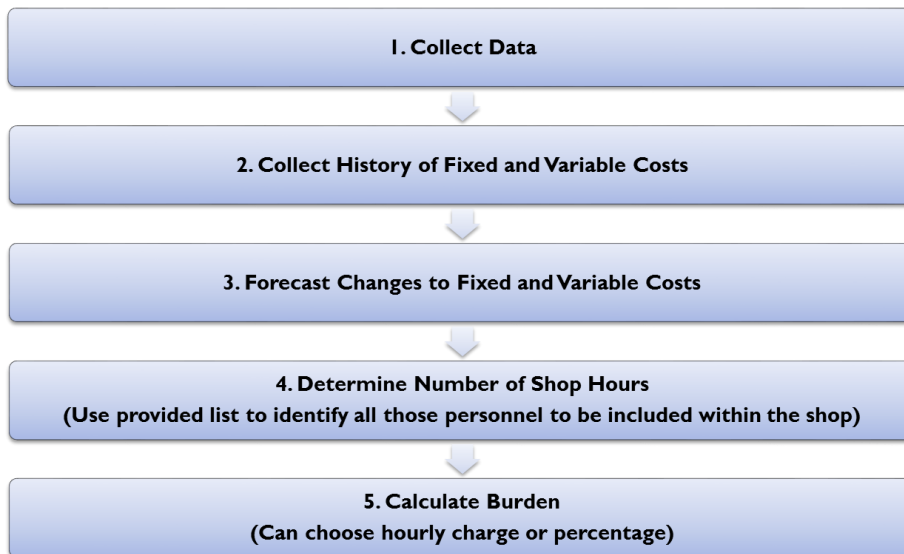
- To calculate the burden rates for an hourly employee, the total number of hours for a period must be estimated, which could include any overtime, double-time, weekend, or other special rates.
- For a salaried employee, the total number of hours do not need to be estimated as that is flat regardless of hours worked. The total wages are calculated by summing the salaries and any anticipated bonuses.

## CALCULATE BURDEN FOR SALARIED EMPLOYEES

$Wages = (Hourly\ Wage\ Rate \times Total\ estimated\ hours) + Anticipated\ Bonuses$

$Installation\ Burden = \frac{Fixed\ Labor\ Costs + Variable\ Labor\ Costs\ (including\ payroll)}{Total\ Actual\ Direct\ Hours}$

## SEQUENCE FOR CALCULATING BURDEN



## A NOTE ON UNIONS

- Contractors with union employees are often required to pay the union directly to pay for union provided benefits, services and training.
- Those union payments should be included in the cost of the benefits for burden calculations, but any union dues paid by the employees should not be included.

## **SUMMARY**

- The nature of a sheet metal and HVAC contracting business is different than a traditional specialty contractor.
- Requires high fixed costs and low variable costs which is very different than most contractors.
- Customers must be educated to understand this difference
- Negotiate **DOWN** your traditional overhead and burden markups
- Negotiate **UP** your spatial coordination, manufacturing and installation overhead and burden
- Recognize and bill for services a-la-carte



## **SPEAKER BIO**

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