

Setting Profit Margins for Bidding

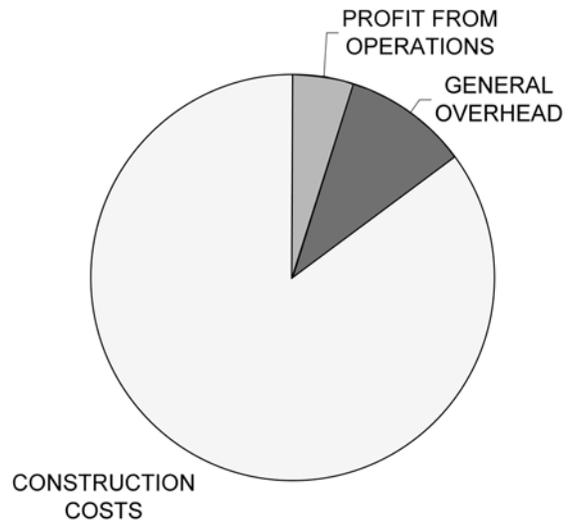
In this chapter you will learn to set profit margins for use in bidding and how the profit changes as the volume of work changes. You will also learn to determine the volume of construction work and profit and overhead markup necessary to cover the costs associated with the general overhead. Profits are used to pay for general overhead costs and provide the owners with a profit. If the profits are insufficient to cover the general overhead costs the company will consume its available cash and fail. If the profits fail to provide the owners with a reasonable profit, the owners may decide there are better places for them to invest their money and the company will lose financing.

A key goal for any construction company is to make money or profit. The investors in a construction company expect that the money they have invested in the company will be used to supply the cash needed to operate the construction company and that the company will generate a profit, thus increasing the value of their investment. To successfully operate a construction company, the company's managers must understand how a construction company generates profit. We limit our discussion of profit to a company's core business of building construction projects; in other words, the profit from construction operations. For the company's income statement shown in Figure 2-3, this profit is recorded as net profit from operations. As such, we ignore other incomes and expenses and income taxes. Additionally, we will assume that all of the equipment costs will be allocated to the construction costs during the course of the year; therefore, the company equipment costs will be zero.

THE PROFIT EQUATION

For a construction company the revenues are in the form of payments from the project owners or from the sale of projects. These revenues are then used for three key items: to pay the construction costs, to pay the general overhead costs, and to

FIGURE 10-1 Use of Revenues



provide the profit for the investors in the construction company. The use of the revenues is shown in Figure 10-1.

The construction costs include both the direct and indirect (project overhead) costs from all of the construction projects when all equipment costs have been allocated to the construction costs. The general overhead costs include those costs discussed in Chapter 9 and are costs that are not attributable to any specific construction project. The general overhead budget used to calculate the profit from operations should be the budget prepared for estimating profit rather than the general overhead budget prepared for cash flow projections. From Figure 10-1 we see that:

$$\text{Revenues} = \text{Construction Costs} + \text{Overhead} + \text{Profit} \quad (10-1)$$

The profit is calculated by solving Eq. (10-1) for the profit as follows:

$$\text{Profit} = \text{Revenues} - \text{Construction Costs} - \text{Overhead} \quad (10-2)$$

This is known as the profit equation.

Example 10-1: For the company's income statement shown in Figure 2-3, determine the company's profit from operations for the year and the percentage of the construction revenues that became profits.

Solution: From Figure 2-3 the company's revenues are \$3,698,945, the construction costs are \$3,186,457, and overhead costs are \$422,562. Substituting these values into Eq. (10-2) to find the profits for the year we get the following:

$$\text{Profit} = \$3,698,945 - \$3,186,457 - \$422,562 = \$89,926$$

The percentage of the construction revenues that became profits is calculated by dividing the profits by the revenues and expressing the answer in percentage form, as follows:

$$\text{Profit \%} = \$89,926/\$3,698,945 = 0.024 \text{ or } 2.4\%$$

In this case, both of these values may be read directly from the income statement in Figure 2-3.

CONTRIBUTION MARGIN

Remembering that general overhead costs may be broken down into its variable and fixed components as follows:

$$\text{Overhead} = \text{Variable Overhead} + \text{Fixed Overhead} \quad (10-3)$$

we can express Eq. (10-2) as follows:

$$\begin{aligned} \text{Profit} &= \text{Revenues} - \text{Construction Costs} - \text{Variable Overhead} \\ &\quad - \text{Fixed Overhead} \end{aligned} \quad (10-4)$$

The contribution margin is the amount of money that a project or projects contributes to the company to be used to pay for the fixed overhead and provide a profit for the stakeholders. The contribution margin is what is left over from the revenues after paying the construction costs—which are considered a variable cost—and the variable portion of the overhead. The equation for the contribution margin may be written as follows:

$$\begin{aligned} \text{Contribution Margin} &= \text{Revenues} - \text{Construction Costs} \\ &\quad - \text{Variable Overhead} \end{aligned} \quad (10-5)$$

Dividing the contribution margin by revenues we get the contribution margin ratio. The equation for the contribution margin ratio may be written as follows:

$$\text{CM Ratio} = \text{Contribution Margin}/\text{Revenues} \quad (10-6)$$

Substituting Eq. (10-5) into Eq. (10-6) we get the following:

$$\begin{aligned} \text{CM Ratio} &= \text{Revenues}/\text{Revenues} - \text{Construction Costs}/\text{Revenues} \\ &\quad - \text{Variable Overhead}/\text{Revenues} \\ \text{CM Ratio} &= 1 - \text{Construction Costs}/\text{Revenues} \\ &\quad - \text{Variable Overhead}/\text{Revenues} \end{aligned} \quad (10-7)$$

Because all of the variable costs in Eq. (10-5) are considered to vary directly with revenues, the contribution margin varies directly with revenues and the contribution margin ratio may be considered to be a fixed percentage of the revenues. Alternately, Eq. (10-6) may be written as follows:

$$\text{Contribution Margin} = \text{CM Ratio}(\text{Revenues}) \quad (10-8)$$

Substituting Eqs. (10-5) and (10-8) into Eq. (10-4) we get the following:

$$\begin{aligned} \text{Profit} &= \text{Contribution Margin} - \text{Fixed Overhead} \\ \text{Profit} &= \text{CM Ratio}(\text{Revenues}) - \text{Fixed Overhead} \end{aligned} \quad (10-9)$$

Example 10-2: What are the contribution margin and the contribution margin ratio for the company's income statement shown in Figure 2-3 if \$45,000 of the overhead is considered variable overhead?

Solution: Using Eq. (10-5) to get the contribution margin we get the following:

$$\begin{aligned} \text{Contribution Margin} &= \$3,698,945 - \$3,186,457 - \$45,000 \\ \text{Contribution Margin} &= \$467,488 \end{aligned}$$

The contribution margin ratio may be calculated by using Eq. (10-6) as follows:

$$\text{CM Ratio} = \$467,488 / \$3,698,945 = 0.126 \text{ or } 12.6\%$$

The contribution margin ratio is used to calculate the break-even volume of work or the volume of work may be used to calculate the break-even contribution margin ratio.

PROJECTING BREAK-EVEN VOLUME OF WORK

Once a company has established a general overhead budget for a year, it can use the historical contribution margin ratio to determine the break-even volume of work that it needs to produce during the year to cover overhead costs and provide a specified profit. The historical contribution margin ratio may be calculated from the company income statement for the previous year as it was done in Example 10-2. The historical contribution margin ratio may need to be adjusted to take into account changing market conditions. For example, during an economic downturn contribution margin ratios often shrink, whereas during a rapidly growing economy, when construction work is plentiful, contribution margin ratios often increase.

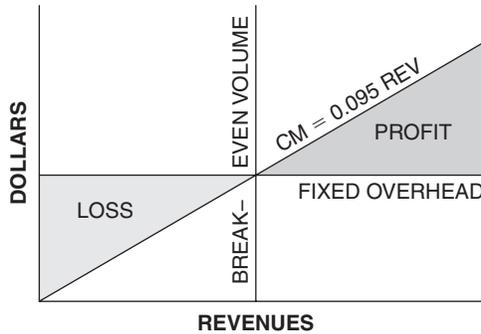
By setting profit in Eq. (10-9) equal to zero we can determine the break-even volume of work for a specific contribution margin and fixed overhead. The break-even volume of work is expressed in dollars of revenue.

Example 10-3: Determine the break-even volume of work for a company with a fixed overhead of \$350,000 and a contribution margin ratio of 9.5%.

Solution: Using Eq. (10-9) and setting the profit equal to zero we get the following:

$$\$0 = 0.095(\text{Revenues}) - \$350,000$$

FIGURE 10-2 Break-Even Volume



Solving for revenues we get the following:

$$0.095(\text{Revenues}) = \$350,000$$

$$\text{Revenues} = \$350,000/0.095 = \$3,684,211$$

The company in Example 10-3 will need to generate \$3,684,211 in revenues to cover its fixed overhead. If it generates less than \$3,684,211 the company will not cover the fixed overhead and will lose money on construction operations. For the revenues in excess of \$3,684,211, the entire contribution margin will be profit from operations.

Figure 10-2 shows the relationship between the revenues and the break-even volume for Example 10-3. The diagonal line represents the contribution margin equal to $0.095 \times \text{Revenues}$. The horizontal line represents the fixed overhead for the example. The break-even volume occurs where these two lines intersect. For revenues to the left of the break-even volume, the distance between these two lines represents the size of the loss. For revenues to the right of the break-even volume, the distance between these two lines represents the size of the profit.

Alternately, a company may have a required level of profit. By setting profit in Eq. (10-9) equal to the required level of profit we can determine the break-even volume of work for a specific contribution margin and fixed overhead. The break-even volume of work is expressed in dollars of revenue.

Example 10-4: Determine the break-even volume of work for a company with a fixed overhead of \$350,000, a contribution margin ratio of 9.5%, and a required level of profit of \$190,000.

Solution: Using Eq. (10-9) and setting the profit equal to \$190,000 we get the following:

$$\$190,000 = 0.095(\text{Revenues}) - \$350,000$$

Solving for revenues we get the following:

$$0.095(\text{Revenues}) = \$540,000$$

$$\text{Revenues} = \$540,000/0.095 = \$5,684,211$$

The company in Example 10-4 will need to generate \$5,684,211 in revenues to cover its fixed overhead and make \$190,000 in profit. If it generates less than \$5,684,211 it will not meet its profit requirements. If the company generates more than \$5,684,211 it will exceed its profit requirements.

PROJECTING BREAK-EVEN CONTRIBUTION MARGIN RATIO

Once a company has established a general overhead budget for a year, it can use the anticipated volume of work to project the required contribution margin ratio. The volume of work may be estimated by looking at historical levels of work and making adjustments to reflect the economic conditions. Alternately, the volume of work may be projected based on the work the company thinks it can get during the upcoming year.

By setting profit in Eq. (10-9) equal to zero we can determine the break-even contribution margin ratio for a specific level of revenues and fixed overhead.

Example 10-5: Determine the break-even contribution margin ratio for a company with a fixed overhead of \$350,000 and revenues of \$3,250,000.

Solution: Using Eq. (10-9) and setting the profit equal to zero we get the following:

$$\$0 = \text{CM Ratio}(\$3,250,000) - \$350,000$$

Solving for contribution margin ratio we get the following:

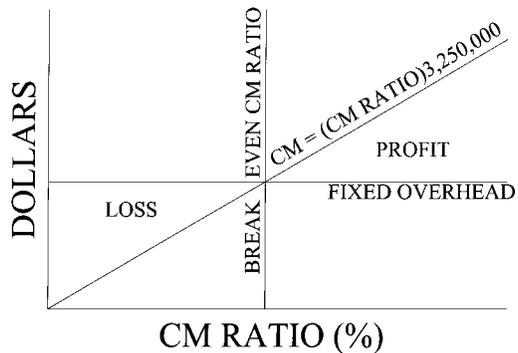
$$\text{CM Ratio}(\$3,250,000) = \$350,000$$

$$\text{CM Ratio} = \$350,000/\$3,250,000 = 0.1077 \text{ or } 10.77\%$$

The company in Example 10-5 will need to maintain a contribution margin ratio of 10.77% to cover its fixed overhead. If its contribution margin ratio is less than 10.77% the company will not cover its fixed overhead costs and will lose money on construction operations. If the contribution margin ratio is greater than 10.77%, the difference between the actual contribution margin ratio and 10.77% will be profit. For example, if the contribution margin ratio were 15%, 4.23% (15.00 – 10.77) of the company's revenues would be profit from construction operations.

Figure 10-3 shows the relationship between the contribution margin and the break-even CM Ratio for Example 10-5. The diagonal line represents the contribution margin equal to $\text{CM Ratio} \times \$3,250,000$ (the estimated revenues). The horizontal line represents the fixed overhead for the example. The break-even CM Ratio occurs where these two lines intersect. For revenues to the left of the break-even CM Ratio, the distance between these two lines represents the size of the loss. For revenues to the right of the break-even CM Ratio, the distance between these two lines represents the size of the profit.

FIGURE 10-3 Break-Even
CM Ratio



Alternately, a company may have a required level of profit. By setting profit in Eq. (10-9) equal to the required level of profit we can determine the break-even contribution margin ratio for a specific level of revenues and fixed overhead.

Example 10-6: Determine the break-even contribution margin ratio for a company with a fixed overhead of \$350,000, revenues of \$3,250,000, and a required level of profit of \$190,000.

Solution: Using Eq. (10-9) and setting the profit equal to \$190,000 we get the following:

$$\$190,000 = \text{CM Ratio}(\$3,250,000) - \$350,000$$

Solving for contribution margin ratio we get the following:

$$\text{CM Ratio}(\$3,250,000) = \$540,000$$

$$\text{CM Ratio} = \$540,000/\$3,250,000 = 0.1662 \text{ or } 16.62\%$$

The company in Example 10-6 will need to maintain a contribution margin ratio of 16.62% in order to meet profit requirements. If the contribution margin ratio is less than 16.62% the company will not meet its profit requirement. If the contribution margin ratio is greater than 16.62% the company will exceed its profit requirement.

When a company has multiple divisions or profit centers, the break-even volume of work or break-even contribution margin may be established for each division or profit center by allocating the general overhead to the divisions or profit centers and solving for the break-even volume of work or break-even contribution margin for each division or profit center. Different profit and overhead markups may be established for materials, labor, subcontractors, equipment, and other cost types in the same manner. Allocation of general overhead is discussed in Chapter 11.

ADJUSTING THE FINANCIAL MIX

If the calculated break-even volume of work exceeds the volume of work that the company thinks it can perform, the contribution margin ratio needs to be increased. This may be done by raising prices; however, this often results in a reduced volume of work. If the company's clients are not price sensitive, raising prices may solve the problem. If the company's clients are price sensitive—as is the case when clients solicit multiple bids for their work—raising prices may further reduce the volume of work and may only aggravate the problem. When raising prices is not an option, the company must reduce the fixed overhead costs or increase the contribution margin ratio by reducing construction costs or variable overhead costs.

When the break-even contribution margin ratio exceeds the historical contribution margin ratio, prices need to be raised or construction costs need to be reduced to achieve the contribution margin. After raising prices and reducing construction costs, if the break-even contribution margin ratio exceeds the contribution margin ratio that the company thinks it can obtain from its customers, the contribution margin needs to be decreased. This may be done by increasing the volume of work, thereby spreading the overhead and required profit over a higher volume of work. Alternately, the contribution margin may be decreased by decreasing overhead costs or profit expectations.

Remembering that a key goal of any construction company should be to make a profit, the object of looking at the profit equation and performing a break-even volume of work or break-even contribution margin ratio analysis is to clarify how the company is going to make a profit. The outcome of this analysis is for the company's management to set target levels for the company's revenues, gross profit margin, general overhead costs, and profit from operations, along with a realistic plan outlining how it is going to achieve these target levels. This plan—along with the target levels—should guide the company's marketing strategy. If the plan is inconsistent with the company's current marketing strategy, the company needs to revise the plan or be committed to change its marketing strategy. When making a change in a company's marketing strategy it is often better to phase in the new strategy over time rather than make an abrupt change.

Too often a company is focused on increasing the volume of its work rather than on its profitability. When a company focuses on volume of work without taking into account profit, it often settles for smaller profit margins or takes unprofitable work in order to increase its volume of work. These increases in the volume of work are often accompanied by the need to increase its main office support, thus increasing general overhead. It is not uncommon for companies that pursue this strategy to find that significant increases in the size of the company and the volume of work that it performs have been seen, yet its profits have improved little or actually declined.

Many companies have found that profits could increase by being more selective as to the type of project that is bid on, in essence specializing in certain

areas of the construction market. This specialization allows the company to learn the ins and outs of a few specific segments of the market. As similar work is performed over and over the company and its employees move down the learning curve, learning where the common pitfalls occur and how to successfully avoid them. By reducing the number of construction problems that occur, the company can reduce the time it takes to construct the project and reduce the project overhead. Additionally, it learns to avoid costly construction mistakes.

To demonstrate this, let's compare two companies both performing a small office remodel in a high-rise building. The first company has performed many projects in high-rise buildings and has learned by experience that doorframes for double-hung doors often must be ordered in pieces (so that they can be transported up the elevator) and fabricated on site. The first company orders materials and schedules the work with this in mind. The second company, with little experience working in high-rise buildings, orders the doorframes for the double-hung doors fully fabricated, not taking into account the size limitations of the elevators. The doorframes arrive on the day they are to be installed. When trying to get the doorframes to their final location the second company realizes that the doorframes will not fit in the elevator. As a result construction has to be delayed while someone is found to cut the frames and then weld them back together once they arrive at their final destination or new doorframes have to be ordered; meanwhile progress on the project grinds to a halt.

In addition to learning to avoid the common pitfalls, specialization allows companies to learn better ways of performing the work. This includes time-saving shortcuts as well as changes that can be made in the design that will achieve the same structural and aesthetic quality, while cutting costs and construction time. Companies also learn more efficient ways to schedule the work as well as the optimum crew size or mix.

Specialization also allows companies the opportunity to develop relationships with suppliers and subcontractors who share the same area of specialization. These relationships can result in better pricing from subcontractors and suppliers, which in turn may be used as a competitive edge when bidding or used to increase a company's profit.

There are two common pitfalls when trying to focus on profits rather than the volume of work. First, because of the highly competitive nature of the construction industry most owners of construction companies are highly competitive. Many owners have a hard time losing a bid, even if there is little or no profit in the job. Owners need to change the way they measure their success from winning every bid to the profitability of their company. Second, when most construction companies start up, owners need to take every job they can get just to survive. As a company grows, it continues to think that it needs to take every job and fails to specialize. Once a company has enough work to survive it needs to begin to focus on specializing and increasing its profitability. This may require passing on a long-time customer who has provided marginally profitable work to another contractor. In Chapter 11 we look at customers as profit centers.

Once a company has set a target level for the gross profit margin it often requires that all projects meet a minimum gross profit margin, which is included in its bids in the form of a profit and overhead markup (P&O Markup).

PROFIT AND OVERHEAD MARKUP

The profit and overhead markup is not the same as the gross profit margin; however, they are mathematically related. If we were to look at a construction project with revenues of \$1,000,000 and construction costs of \$850,000, the gross profit equals the revenues less the construction costs or \$150,000 (\$1,000,000 – \$850,000). The gross profit margin is calculated using Eq. (6-17) as follows:

$$\text{Gross Profit Margin} = \$150,000/\$1,000,000 = 0.150 \text{ or } 15.0\%$$

If we were to mark up the construction costs by 15% to get the bid price (revenue from the project) we would get the following:

$$\text{Revenue} = \$850,000(1 + 0.15) = \$977,500$$

which is \$22,500 (\$1,000,000 – \$977,500) less than the actual revenues from the project. The gross profit margin and the profit and overhead markup are related by the following equation:

$$\text{P\&O Markup} = \text{Gross Profit Margin}/(1 - \text{Gross Profit Margin}) \quad (10-10)$$

The profit and overhead markup that is equal to a 15% gross profit margin is calculated by using Eq. (10-10) as follows:

$$\text{P\&O Markup} = \text{Gross Profit Margin}/(100 - \text{Gross Profit Margin})$$

$$\text{P\&O Markup} = 15/(100 - 15) = 17.65\%$$

Applying a profit and overhead markup of 17.65 to the construction costs of \$850,000 we get the following:

$$\text{Revenue} = \$850,000(1 + 0.1765) = \$1,000,025$$

with the difference being due to the rounding of the profit and overhead markup.

For the company that has determined its break-even contribution margin ratio, the gross profit margin is calculated from the contribution margin ratio as follows:

$$\text{Gross Profit Margin} = \text{CM Ratio} + \text{Variable Overhead}/\text{Revenues} \quad (10-11)$$

Example 10-7: Determine the profit and overhead markup for a company that wants to maintain a 16% gross profit margin.

Solution: Using Eq. (10-10) to find the profit and overhead markup we get:

$$\text{P\&O Markup} = 16/(100 - 16) = 0.1905 \text{ or } 19.05\%$$

When preparing a bid, the profit and overhead markup has the advantage of being easier to calculate than the gross profit margin because it is expressed as a percentage of construction costs rather than a percentage of the total bid.

Not all projects can or should be bid at the same profit and overhead markup. A company should set a minimum profit and overhead markup and then increase the markup when condition warrants. The hard part is to determine when the conditions warrant an increase in the profit and overhead markup. There are some common reasons for increasing the profit and overhead markup.

First, the company is submitting a bid as a courtesy to the customer but really doesn't want the project unless it is profitable. This may happen when a company is asked to bid on a project that is outside its geographical area or area of specialization.

Second, the project is a difficult project, has a high degree of risk, or the project owners are difficult to work with. The level of risk may be increased by poor document quality, short construction schedules, high liquid damages, and uncertainty that may lead to cost or schedule overruns. In this case the risk and headaches of the project are only acceptable to the construction company if there is a higher level of profit.

Third, the company is bidding on the project to check its prices but really doesn't want the project unless it is profitable. When starting to bid after not bidding for a few months or bidding in a new market, it is wise to bid on two or three projects to get a feel for the market and to get back into a bidding rhythm. This gives the company's management a chance to get a feel for the level of profit and overhead markup that it can add to its bids, as well as give estimators a chance to warm up. Should they win the job by accident, the project usually has a good profit margin.

Fourth, the other companies bidding on the project are expected to be charging a higher profit and overhead markup or have higher construction costs. When competition in the market is stiff, companies can seldom charge more than the minimum profit and overhead markup; however, when competition is meager companies can often increase profit and overhead markup. To assist in determining when to charge a higher profit and overhead markup, a company must track how a competitor's prices compared to its own. The easiest way to do this is to keep a record of all of the competitors who have bid against the company along with each of the bids and the profit and overhead markup that our company would have had to add to our construction costs for our bid to equal the competitor's bid. This may be done by using the following equation:

$$\text{P\&O Markup} = \text{Bid/Construction Costs} - 1 \quad (10-12)$$

Example 10-8: Your construction company recently bid against ABC Construction Company. Your construction costs were \$157,260 and you added a 15% profit and overhead markup for a total bid of \$180,849. ABC’s bid was \$179,249. What profit and overhead markup would you need to add to your construction costs to get ABC’s bid?

Solution: The profit and overhead markup is determined as follows using Eq. (10-12).

$$\text{P\&O Markup} = \$179,249 / \$157,260 - 1 = 0.1398 \text{ or } 13.98\%$$

When tracking changes it is important to keep track of the name of the project and the date bid as well as the competitor’s bid and your construction costs. Competitors may be tracked using the simple spreadsheet format shown in Figure 10-4.

When deciding whether to increase the profit and overhead markup you need to take into account the size of the project, type of project, and the bid date. It is important to take size into account because as the project’s size increases the profit and overhead markup tends to decrease. It is important to take the type of project into account because some companies may bid different types of projects at different profit and overhead markups. Finally, it is important to take the bid date for the data into account because projects bid in the spring—when companies are looking for this year’s work—are often bid at a lower rate than projects later in the year when contractors begin filling up.

Example 10-9: Your construction company is bidding against the two construction companies shown in Figure 10-2 on a municipal project with an engineer’s estimate of \$750,000 to \$850,000. Your company’s minimum profit and overhead markup is 8%. What are the chances of increasing your profit and overhead markup above the minimum 8%?

	A	B	C	D	E
1	ABBCO				
2	Project	Date	Bid	Costs	P&O
3	West City Park	6/24/2002	\$ 875,256	\$ 798,952	9.55%
4	Platt Park Restrooms	8/14/2002	\$ 52,326	\$ 42,165	24.10%
5					
6					
7	ABC Construction				
8	Project	Date	Bid	Costs	P&O
9	South Street Improvements	3/15/2002	\$ 179,249	\$ 157,260	13.98%
10	West City Park	6/24/2002	\$ 859,462	\$ 798,952	7.57%
11	East Side Community Center	7/22/2002	\$ 1,152,634	\$ 1,092,215	5.53%

FIGURE 10-4 Spreadsheet for Tracking Competitors’ Bids

Solution: Your company bid against ABC Construction on the West City Park—a municipal project of similar size—where their bid was 7.57% above your costs. It is unlikely that you will be able to raise your profit and overhead markup and still be competitive with ABC Construction. You also bid against ABBCO on the same project, where their bid was 9.55% above your costs. If ABC Construction were not to bid, you might be able to raise your profit and overhead a little.

The construction bidding market is constantly changing. Contractors who are winning work and feeling less pressure to get work may raise their profit and overhead markups, while other contractors are completing projects and need more work and may lower their profit and overhead markups to get this work. Meanwhile contractors are adjusting the profit and overhead on courtesy bids or when they perceive that a project has a higher degree of risk. All of this makes it hard to predict where contractors are going to bid. By tracking your competitors you increase your odds of reading the market right.

CONCLUSION

Revenues from operations are used to pay construction costs, pay overhead costs, and provide a profit for the investors. By dividing overhead into a fixed and variable portion, the percentage of construction revenues available for paying the fixed overhead costs and to provide a profit to the investors may be determined. This percentage is known as the contribution margin ratio. The break-even volume of work may be calculated from the contribution margin ratio, the fixed overhead, and required profit. Alternately, the break-even contribution margin ratio may be calculated from the volume of work, the fixed overhead, and required profit. These break-even analyses may be used to help the managers of construction companies set target level for revenues, gross profit margin, general overhead costs, and profit from operations for the upcoming year.

The gross profit margin is incorporated into the construction project by adding a profit and overhead markup. The gross profit margin is not the same as the profit and overhead markup; however, they are mathematically related by Eq. (10-10). Companies should set a minimum profit and overhead markup, which may be raised when conditions warrant. Tracking a company's competitors helps a manager determine when to increase the profit and overhead markup.

PROBLEMS

1. A construction company has total revenues of \$650,000, total construction costs of \$509,000, and general overhead costs of \$65,000 for the year. Determine the company's total profit for the year and the percentage of the construction revenues that became profits.

2. A construction company has total revenues of \$1,150,000, total construction costs of \$956,000, and general overhead costs of \$159,000 for the year. Determine the company's total profit for the year and the percentage of the construction revenues that became profits.
3. What are the contribution margin and the contribution margin ratio for the company in Problem 1 if \$15,000 of the overhead is considered variable overhead?
4. What are the contribution margin and the contribution margin ratio for the company in Problem 2 if \$53,000 of the overhead is considered variable overhead?
5. Determine the break-even volume of work for a company with a fixed overhead of \$250,000 and a contribution margin ratio of 11.3%.
6. Determine the break-even volume of work for a company with a fixed overhead of \$72,000 and a contribution margin ratio of 14.0%.
7. Determine the break-even volume of work for a company with a fixed overhead of \$138,000, a contribution margin ratio of 8.9%, and a required level of profit of \$100,000.
8. Determine the break-even volume of work for a company with a fixed overhead of \$63,000, a contribution margin ratio of 11.0%, and a required level of profit of \$60,000.
9. A construction company has a fixed overhead of \$100,000 and a variable overhead of 2% of revenue. Historically, construction costs have been 90% of revenue. What is the minimum amount of sales that are required to break even?
10. A construction company has a fixed overhead of \$60,000 and a variable overhead of 2.5% of revenue. Historically, construction costs have been 88% of revenue. What is the minimum amount of sales that are required to break even?
11. Determine the break-even contribution margin ratio for a company with a fixed overhead of \$115,000 and revenues of \$1,500,000.
12. Determine the break-even contribution margin ratio for a company with a fixed overhead of \$92,000 and revenues of \$450,000.
13. Determine the break-even contribution margin ratio for a company with a fixed overhead of \$115,000, revenues of \$1,500,000, and a required level of profit of \$85,000.
14. Determine the break-even contribution margin ratio for a company with a fixed overhead of \$92,000, revenues of \$450,000, and a required level of profit of \$45,000.
15. Determine the profit and overhead markup for a company that wants to maintain an 8% gross profit margin.
16. Determine the profit and overhead markup for a company that wants to maintain a 12% gross profit margin.

17. Your construction company recently bid against ABC Construction Company. Your construction costs were \$265,815 and you added an 11% profit and overhead markup for a total bid of \$295,055. ABC's bid was \$301,251. What profit and overhead markup would you need to add to your construction costs to get ABC's bid?
18. Your construction company recently bid against ABC Construction Company. Your construction costs were \$1,125,572 and you added a 6% profit and overhead markup for a total bid of \$1,193,106. ABC's bid was \$1,179,999. What profit and overhead markup would you need to add to your construction costs to get ABC's bid?