

Your Bad Project Just Got Worse:
The Basics of Cost-to-Complete Forecasting
By Scott Kimpland, Director, FMI Corporation

As the president and vice president of operations for Acme Mechanical, Inc. leave the monthly cost-to-complete meeting on the St. Joseph's Hospital Expansion project, both are visibly upset and shocked. The president tells the vice president that they need to meet for a few minutes to discuss what they just heard. Once inside the president's office, they close the door and begin to criticize the project manager because for the third month in a row, they will take a significant write-down on this project.

For the first eight months, the project manager had been telling them that it was going to be tight, but the project was on budget. For the last three months, the project has been stuck at 85% complete, labor costs continue to escalate, and the cumulative write-downs approach a quarter of a million dollars. Everyone, including the project manager, is surprised, hoping that the latest cost-to-complete forecast is accurate and that the project has truly found the bottom.

Does this sound familiar? It happens every month across the industry. Project managers recognize too late in the project that they are going to have significant costs overruns and write-downs. How and why does this happen so often? Having worked with thousands of contractors and tens of thousands of project managers, FMI has developed a good understanding of the reasons behind poor and inaccurate cost-to-complete (CTC) forecasts and why so many companies get surprised with bad news at the end of their projects. While forecasting all of the direct costs and general conditions is an important element of developing an accurate CTC, this lesson will focus on the most variable direct cost item, labor.

The best and most accurate labor CTC is still a forecast or estimate, no matter how well it is done. By definition, a forecast or estimate is a prediction that includes both objective (science) and subjective elements (art). As a result, risk and uncertainty are central to estimating and forecasting, and usually there will be some variance between actual and estimated labor costs. Therefore, the objective to develop a good CTC should be to minimize this variance through use of as much objectivity as possible. Because there are so many moving parts and pieces, developing a reliable CTC requires a broad understanding of the various items that can affect it. Below, we will examine a number of key elements that ultimately impact the quality and reliability of a CTC forecast.

KEY ELEMENTS THAT IMPACT THE CTC

1. Role of the Project Manager.

On a basic level, how the role of the project manager is defined within your company has an impact on the CTC and the project manager's ability to prepare a good CTC. If you believe and support the idea that the project manager's primary responsibilities are to manage the project, know where the project stands financially at all times, and accurately estimate the direct costs for all of the remaining work on a project, you have the role defined correctly. You also have an immediate advantage over other companies that believe the project manager should simply be an administrative manager or glorified submittal clerk. The companies that do the best job on CTC have project managers who are accountable and responsible for overall financial performance of the project. They work closely with the field managers, but are truly the "managers" of projects. Said simply, FMI believes that field managers should be held accountable for meeting and/or beating the budgeted

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**Not what we say
about
our blessings,
but how
we use them,
is the true
measure of our
thanksgiving.**
W.T. Purkiser

**Happy
Thanksgiving!!**



Mechanical Member:
B & L ELECTRIC COMPANY, LLC

B & L Electric Company was formed in 1987 and has been in business for 26 years. We are proud of our accomplishments over these 26 years. Our customers have continued to call us even during the major downturn in the economy.

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NOVEMBER BIRTHDAYS

Cathy Richardson	11/3	Atlantic Electric Company	Wife of Joe
Mike Swindall	11/4	Ahern Rental, Inc.	
Lewis Caswell	11/5	W. O. Blackstone & Co., Inc.	
Mike Kirkland	11/8	W. N. Kirkland, Inc.	
Kristi Soderlund	11/8	Elliott Davis LLC	Wife of Todd
Taylor Brewer	11/10	Easley Mechanical	
Rusty Smith	11/10	Johnson Controls, Inc.	
Karen Linden	11/15	Central Controls, Inc.	Wife of Albert
Mel Rosas	11/16	PinPoint Safety	
Susan Smith	11/16	Easley Mechanical	Wife of Donnie
Albert Linden	11/23	Central Controls, Inc.	
Jim Brewer	11/25	Easley Mechanical	
Randy Jones	11/25	The Chapman Company	
David Gregg	11/26	C. R. Hipp Construction, Inc.	
Nancy Hitchcock	11/26	C. R. Hipp Construction, Inc.	Wife of Al
Brenda Gibbs	11/27	Bear Mechanical Services, LLC	Wife of Fred
Michael Hunter	11/28	Ferguson Enterprises, Inc.	
Sandra DeAntonio	11/29	Transworld, Inc.	Wife of Raymond

Happy Birthday Members!
We Would Like To Announce Yours. If you would like to be listed,
please call the Birthday Hotline at 803-772-7834 or Email to mflowers@mcasc.com

“Tool Box Talks” - Safety Tip**HOUSEKEEPING & TRIPPING HAZARDS**

As each of us works throughout the jobsite, our daily needs require extension cords, air compressor hoses, cutting torch hoses and welding leads. Each of these cords or hoses acts as an umbilical cord providing us with the necessary electricity, compressed air, acetylene, oxygen, grounds for welding, and power for the welding stinger. The danger here is that any of these leads can become tangled and create tripping hazards if they are not placed properly before you start work.

We must take the time to run them underneath walkways, overhead if needed, away from access doors and ramps, and away from pinch points. Leads and hoses are subject to cuts, abrasions, puncture and plain old normal wear and tear. Remember to run leads, cords and hoses out of the way, cover them properly and most of all, do not let them become tripping hazards.

There are many other objects around the work area that are just as dangerous. Have you ever stepped on a screwdriver or a short piece of pipe and felt your feet about to slip out from under you? Did you ever trip over a shovel carelessly left on the ground? Have you ever thought of how well a wire snare works in catching small or large animals? How about your foot! We must take time to pick up long pieces of tie wire, if not, you may be the next one that is snared.

All of the above can be solved if we do a little housekeeping while we work. Cleaning up at the end of the job is fine, in fact it is essential, but job cleanup is not a one shot proposition, it is a continuous operation. It is an important factor in construction efficiency and in the prevention of work injuries. Remember these tips - store material and tools neatly, cleanup scrap as work progresses, keep walkways clear at all times, and take care of your tools. Do not leave them where they will cause you or others to fall.

GOOD JOBSITE HOUSEKEEPING PROMOTES EFFICIENCY AND MORALE, AND HELPS TO REDUCE ACCIDENTS. "THE INJURY YOU PREVENT MAY BE YOUR OWN!"

PinPoint Safety, LLC - Mel Rosas, formerly, RSS Safety, LLC
12216 Pinegate Court, Pineville, NC 28134-9139
Telephone (704) 277-5673 Fax (704) 900-8241

Condolences

Mr. & Mrs. John Creech & Family
Ogletree, Deakins, Greenville
On the loss of her mother
Celia Ellington

Mr. F. Leverne Hill & Family
Mr. & Mrs. Frank Hill & Family
Hill Plumbing & Electric Co., Inc., Sumter
On the loss of wife & stepmother
JoAnn McCaskill-Hill

Upcoming Events!!!

5th Annual Midlands Area Nine at Night
Thursday, April 3, 2014
Charwood Country Club, W. Columbia, SC

Welcome New Members

Piedmont Area:

Midlands Area:

Erlinda McCoy - BarMack Contracting, Inc.
Columbia

Pee Dee Area:

Coastal Area:

Happy Anniversary

Should your name be here?
If so, call 1-803-772-7834

Concerns

Jim Maguire, Eck Supply Company, Charleston

(Continued from page 1)

labor hours, and project managers should be accountable and responsible for meeting and/or beating all budgeted direct costs, including labor costs. If you define the project manager's role more as the administrative type and less as a real manager, you would be better-served to change his or her title to what FMI would call a "project witness".

2. Good Project Budget.

Good cost-to-complete forecasting requires a good project budget. This means that prior to starting work and incurring actual labor costs, the project manager and field manager have worked collaboratively to set up the format and logic for how labor costs and hours will be tracked on the project. This includes things like how many labor codes are appropriate and a work breakdown structure that closely mirrors how the project will actually be constructed in the field. The objective should be to have just enough labor codes to know where the project is over or under budget on labor and be able to identify specifically how each work task is performing. If left to a detailed and analytical estimator, the project budget would have hundreds of labor codes. If left to the field manager responsible for reporting, coding and tracking time, the budget would have one code for labor. Somewhere between these extremes of labor codes is preferable for all projects and best determined by the project manager and field manager, who will be responsible for having to estimate future labor and prepare the monthly CTCs. Benefits of requiring the project manager and field manager to work together on developing the project budget include:

- It forces the people executing the project to really understand and plan it, and is one element of good preplanning.
- It results in a logical budget with the correct number of phases, labor codes and work breakdown structure. If the budget makes sense to the team, the chance of getting things tracked and coded correctly is much better. Doing CTC when the budget is logical and costs are accurately coded is also much easier.
- It creates buy-in and ownership of the project budget. This eliminates any potential finger-pointing between estimating and operations at the end of the project, particularly if there are labor cost overruns.
- It identifies bid busts and estimate problems early. Rather than finding out that the original estimate was wrong at 80% complete, this budgeting process allows the team to identify any problems early, thereby giving it a much better chance of developing a solution or finding items to save labor somewhere else on the project. The original project budget really serves as the initial CTC. If a problem is identified and everyone agrees that the estimate has problems, this is the time to recognize and acknowledge it. Ignoring it and hope that it goes away is only going to delay the problem.

3. Accurate Productivity Tracking and Reporting.

Odds of reliable CTCs increase with accurate tracking and reporting of productivity and time. Productivity is defined as output per unit of input. In construction, this is often measured as units/man-hour or units/man-day. When developing a CTC, knowing the actual production rates on the work installed to date is a huge advantage. The field manager should be measuring, tracking and reporting the quantity of work installed every day. For companies that require their field managers only to track time and report it to a code without tracking the actual amount of work installed, trying to identify how much work is remaining and the labor required to complete it will be subjective at best. By having real data that shows the actual quantity of work installed and the man-hours/man-days required to install it, determining exactly how much work and labor estimates remain will be much more objective.

4. Agreement on Percent Complete.

In addition to having productivity data for the work installed job to date, a reliable CTC requires the project manager and field manager to walk the job, review every work task and agree to the percent complete. By tracking production daily as described above, these tasks should be much easier, since the productivity data should provide a summary of the amount of work installed. By knowing the budgeted quantities from the takeoff and quantities installed to date, the team can come close to quantifying the remaining work to be completed. Companies with reliable CTCs require the project manager and field manager to be in complete agreement on the percent complete and, at least, on the labor hours to complete the remaining work. While most project managers and field managers understand the basic concept of percent complete, many do not know that to be most accurate and reliable, it has to be calculated as follows:

$$\text{Percent Complete} = \frac{\text{Costs to Date}}{\text{Costs to Date} + \text{Costs to Complete Remaining Work}}$$

5. Changing Production Rates.

Even with good productivity data on the work that has been installed and an accurate assessment of what work needs to be completed, there is a certain amount of art and judgment that goes into forecasting CTC. Simply assuming that you will con-

(Continued from page 4)

tinue to work at the same production rates as the work to date is not a good assumption. There are a number of variables that can and will cause the productivity rates on the project to change. The project team should consider these and adjust the estimated production rates on the remaining work accordingly. A few variables to consider include the following:

- Productivity in the first and last 10% of a project is rarely as high as it is in the middle 80%. This is sometimes referred to as the S-curve of production. There are a number of factors that cause this, but if this fact is not recognized, the labor CTC will likely be underestimated.
- The more change orders a project has and the later in the project that they occur become big factors that drive productivity. On projects with significant changes, particularly ones that occur toward the end, overall productivity is negatively and significantly impacted.
- The quality and reliability of the general contractor's or construction manager's scheduling and trade contractor coordination are also big factors that impact productivity.
- Trade stacking, overstaffing, weather, temperature, climate and overtime are also productivity killers that must be considered when estimating the amount of labor required to complete the remaining work.

6. Labor Plan and Schedule.

A labor plan/schedule for the project is another way to help validate and add objectivity to the CTC. A good labor plan/schedule is developed by the project manager and superintendent at the beginning of the project and updated on a monthly or even weekly basis. The labor plan/schedule should mirror the overall project schedule and include crew sizes and durations for each work activity. It should also aggregate in such a way as to reconcile with the budgeted man-hours per activity and the total of all budgeted project labor hours.

The labor plan includes how individual activities will be staffed on the project from start to finish. If at any time the actual number of people on the project varies from the plan, the project team needs to evaluate. If the number of people on the project is larger than planned but activity durations and/or the completion date is not changing, beware; you are about to have an unpleasant surprise! If the labor plan/schedule was used to help develop your previous CTC, the team must be disciplined enough to maintain the planned crew sizes. All too often, the general contractor or construction manager demands more manpower from the trade contractors to complete the final push of the project, and undisciplined trades react by sending more labor. If put under still more pressure, they then begin working overtime. Sending more bodies and working more overtime typically cause a decrease to productivity (units/man-hour) and create a huge, unexpected labor overrun late in the project.

7. Change Orders.

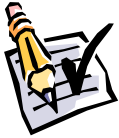
A good CTC requires that the project cost budget must be current and reflective of all change orders. In spite of the contractual terms, rarely do trade contractors have a signed change order in hand before starting work on a change order. In many cases, the contract actually requires them to complete the directed work with no agreement on price. While any objective person would clearly consider this an unfair practice in allocating risks, it has become an industry norm. The result is that the trade contractor performs the work, takes all of the risks and ends up negotiating a price, often for a fraction of the true cost, months after the work is completed.

Since one data point for doing a CTC is the most current job cost report, it is important to ensure that the budgeted labor costs and budgeted labor hours are updated at the time that we commit to perform the work. It may be necessary to wait until you have received a signed change order to recognize the additional revenue from the change order; it is far too late to update your budget. The cost budget for estimated labor dollars and hours for change-order work must be entered at the time you commit to do the work. How and whether you get paid for this work may depend on receiving a signed change order, but this is a completely different issue.

Remember, your estimators are expected to provide a CTC on every project that they bid with a half-baked set of plans, absolutely no real productivity history for the specific project and no work completed to date. By having the benefit of actual work put in place, some real production data and a deeper knowledge of the project that comes with time, it is more than fair and realistic to expect your project managers to have much more reliable estimates and forecasts than your estimators were able to produce on bid day.

This lesson only begins to address the basics of a good CTC for labor. There are many other intricacies and nuisances to developing an accurate and reliable forecast for all of the direct costs on a project. The major areas described only begin to outline the art and science that go into this complex and confusing topic. Hopefully, this lesson provides some basic guard-rails and a starting point by which to evaluate whether your company's CTC process is accurate and reliable.

Scott Kimpland is a director at FMI Corporation. He can be reached at 813.636.1263 or via email at skimpland@fminet.com.



MCASC 2013 COURSE REGISTRATION



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NOTE:

All Courses Will Be Held At
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PLEASE PLACE A CHECK BESIDE EACH COURSE YOU WISH TO REGISTER FOR:

AL & GA APPROVED

- ☐ Collections In The
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Instructors: Dan Brailsford &
 Chuck McDonald

November 20, 2013 – Columbia

Time: 9:00 AM - 4:00 PM

Member: \$175.00

Non-Member: \$225.00

AL & GA APPROVED

- ☐ Legal Update Labor &
 Employment Law and
 Legal Update Benefits Law

Instructors: John Creech & Brian Black

December 11, 2013 - Columbia

Time: 9:00 AM - 4:00 PM

Member: \$175.00

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**Congratulations to our next Associate & Mechanical Members who will be
highlighted in the upcoming issue of "The Tool Box":**

**Elliott Davis, Columbia - Associate Member
Hayes & Lunsford Electrical Contractors, Greenville - Mechanical Member**

NOVEMBER 2013 MONTHLY AREA MEETINGS

MIDLANDS AREA

Thursday, November 7, 2013 @ 6:00 PM
Location: 5728 Shakespeare Road, Columbia
Venue Hosted By: Walker White, Inc.
Meal Sponsored By: Johnson Controls, Inc.

**Topic: "The Challenges of the
Technical Colleges in South Carolina"**
Presented By: Ed Koehne
Business Solutions & Manufacturing Operations Director
Midlands Technical College

PIEDMONT AREA

Tuesday, November 12, 2013 @ 6:00 PM
Location: 103 Woodruff Industrial Lane, Greenville
Sponsored By: Greenville Mechanical, LLC

Topic: An Update on the Affordable Care Act
Presented By: Jay Holloway & Paul Povey
BlueChoice

PEE DEE AREA

Friday, November 22, 2013 @ 6:30 PM
Location: 319 Alligator Road, Effingham
Sponsored By: Walkup Electrical Contractors, LLC

**NOTE: DATE &
LOCATION CHANGE**

**THANKSGIVING & CHRISTMAS
CELEBRATION**

COASTAL AREA

Tuesday, November 26, 2013 @ 6:00 PM
Location: 4790 Goer Drive, N. Charleston
Sponsored By: Hagemeyer NA

Topic: TBA
Presented By: TBA



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***Serving mechanical contractors in
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Mechanicals make it happen -
Be part of the best!

MCASC Vision Statement

The Mechanical Contractors Association of South Carolina (MCASC) will be the leading construction association in South Carolina for specialty contractors and suppliers in the electrical, mechanical (HVAC), and plumbing fields by serving its membership, the industry, and the Community in a vibrant and harmonious fashion.

MCASC Mission Statement

The Mechanical Contractors Association of South Carolina (MCASC) will provide its membership with:

- current business/technical information and support
- a proactive political/legislative agenda
- a joint industry collaboration to improve relative business practices
- an ongoing effort to offer training opportunities for both professional and craft personnel
- educational scholarships for deserving students
- the development of industry related career opportunities

The Association's objective for this mission is to enhance the future of the Construction Industry in South Carolina.