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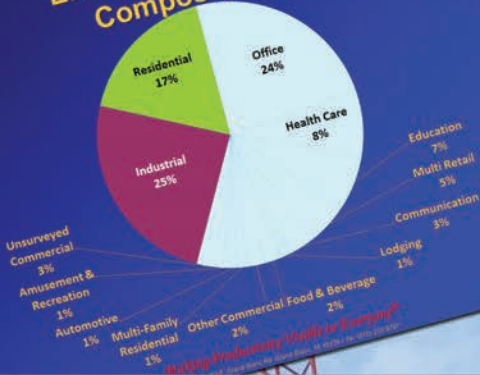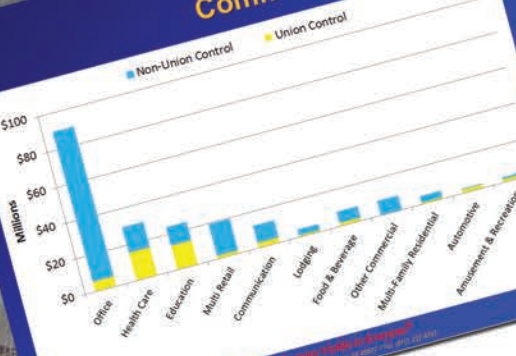
AVOIDING
"KILLER JOBS"
WITH BETTER ACCURACY

BIDDING WITHOUT USING HISTORICAL DATA FOR ESTIMATING JOBS IS LIKE COACHING FOOTBALL WITHOUT REVIEWING PAST GAMES. YOUR OUTCOME WILL SURPRISE YOU.

By Dr. Perry Daneshgari & Dr. Heather Moore

Figure 1: This figure depicts the unpredictability of the job profit outcome for a sample contractor.

"Killer jobs," we've all heard of them, or maybe even been unfortunate enough to have been involved in one. It's these jobs that can single-handedly make the difference in a year-end profit or detrimental loss. And most result in tarnished relationships with employees, customers, and vendors. Sometimes bringing companies to their knees.
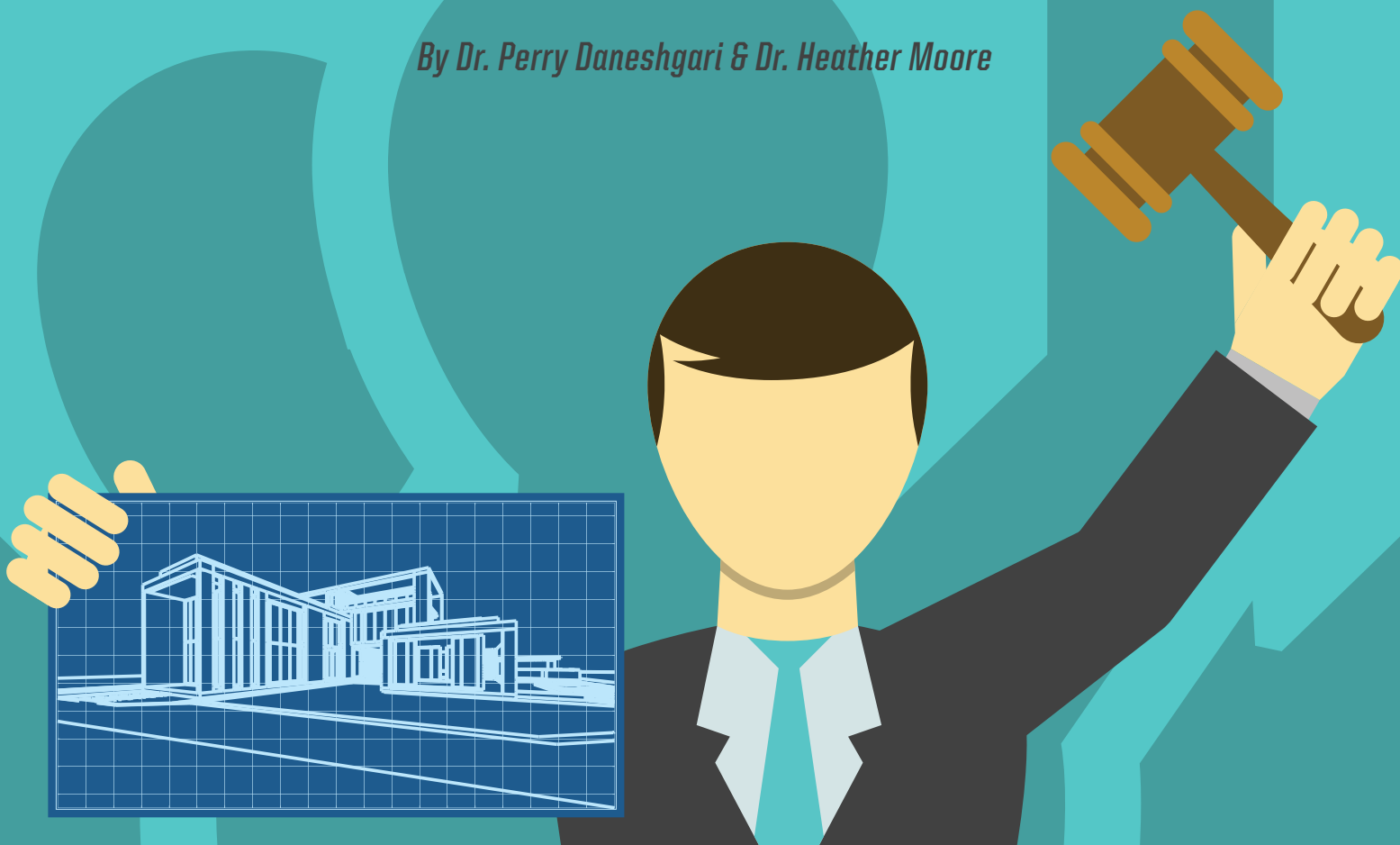
What causes killer jobs? The labor component is usually the first to blame, followed by a poor estimate, and poor management on the general contractor's part or possibly interference from other trades. However, it's the mismanagement of all of these variables that truly creates a killer job scenario, especially when there's lack of appropriate job performance-based feedback in the estimation process. The good news is that if you find yourself going down this road you can turn things around.

The accuracy of estimation in construction can be viewed from two different angles: One from an accounting or "exactness accuracy" standpoint and the other from a "job performance-based accuracy" (JPEA™) perspective. While exactness accuracy is basically just taking the time to review the drawings and come up with a correct count of material, job performance-based accuracy is an area where an estimator's skills can shine. In fact, even the smallest improvement in JPEA™ can lead to significant

improvements in profitability. How? By recognizing the importance of JPEA™ and using available data from estimation, accounting, and field reports, you can create a useful tool for making decisions based on historic performance.

Figure 1 shows a representative contractor's percentage of gross profits by job. The spread between a job's outcomes could be a 40% profit or a 15% loss. This difference between potential profit and loss is far too big to allow for reliable and accurate job performance-based estimates. In this example, the standard deviation is 13.4%, indicating that the next job might earn as high as 28.1% or as low as 1.3% gross profits (on average). On a $100,000 job, this is a potential difference between earning a profit of $28,100 or $1,300. A $1 million job would have an expected profit of either $280,000 or $13,000 – a $267,000 difference!

Estimation must have feedback from both accounting and the job site to better predict the cost of the next project and provide more reliable and predictable information to the company about whether it should pursue the next job. Typically, accounting measurements of production (spent versus budgeted hours or dollars) are mistakenly used as measurements for productivity, which is not unlike driving with the rear-view mirror only. By the time the data from operations in the field have been scored, reported, and produced, weeks,

sometimes months, have passed, leaving no time for the field to react and adjust.

Instead, measure job progress from a labor productivity standpoint using government-accepted measurement practices (JPM-ASTM Standard E2691) in conjunction with your accounting data. Job Productivity Measurement (JPM) identifies productivity deviations in the form of gains or losses and anomalies indicating a special cause, from a productivity reference point. You'll improve your estimation accuracy and have more accurate bids by utilizing specialized tools like JPAC® (Job Productivity Assurance and Control), a computer-enabled process designed to measure, predict, and improve productivity versus a set of construction budget goals set from the perspective of the field according to how your foreman sees the work. In addition, SIS® (Short Interval Scheduling) validates JPAC® productivity measurement and identifies the root causes of special events on the job. This allows contractors to react to project changes with increased agility and responsiveness.

Breaking your budget down so that productivity can be measured and monitored as a weekly trend, both on the overall job and by individual cost codes, allows your foreman and project manager to note the special and common causes of deviation from the original budget. This information is priceless to estimators, who can use it to understand how their bids can get closer to what happens on the job site.

Let's take contact sports for example, football – where one catastrophic event can make or break the game. Say a player failed to make a pass, catch, or fumbled the ball at a critical moment. If the coach only reviews the instant replays and not the whole game or the games in the past, he'll run the risk of having the same outcome in future games. The history of each player of the game is crucial. By closely reviewing all recordings, the coach can then make predictions based on the team's historical performance. However, without taking all of the "live" factors

of the game into account, the coach cannot reliably predict what will happen during gameplay. The important fact is not that the team lost, but why they lost and how it can be avoided the next time. The same holds true in estimating jobs: Without reliable historical data capturing the JPEA™, the celebration on winning the bid on bid day could evolve into a catastrophe on the job site in a very short period of time. Historic job-based data is vital for the initial estimate, or you put yourself more at risk of the job becoming one of those dreaded "killer jobs."

Comparing the estimated versus actual achieved profits from past jobs is the first step of data mining. Figure 2 shows the estimated profits for a set of jobs, with each estimate predicting a gross profit return between 12% and 24%. The reality, however, was somewhat different. At the end of these jobs, the actual profits ranged anywhere from a 41% gain to a 12% loss. Why such a difference? The variation was primarily caused by different labor productivity results in various cost codes. To see this picture, accounting data, estimation data, and field productivity information must all be evaluated collectively.

Ensuring an Accurate Bid

Estimators typically work with an average performance of the cost codes over time. However, using averages of data without considering the range
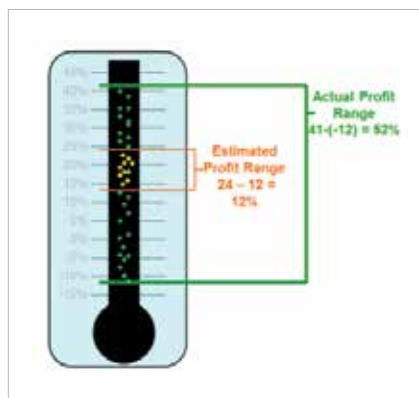
Figure 2: The discrepancy between job estimates and actual profits is an indication of lack of control in job management.
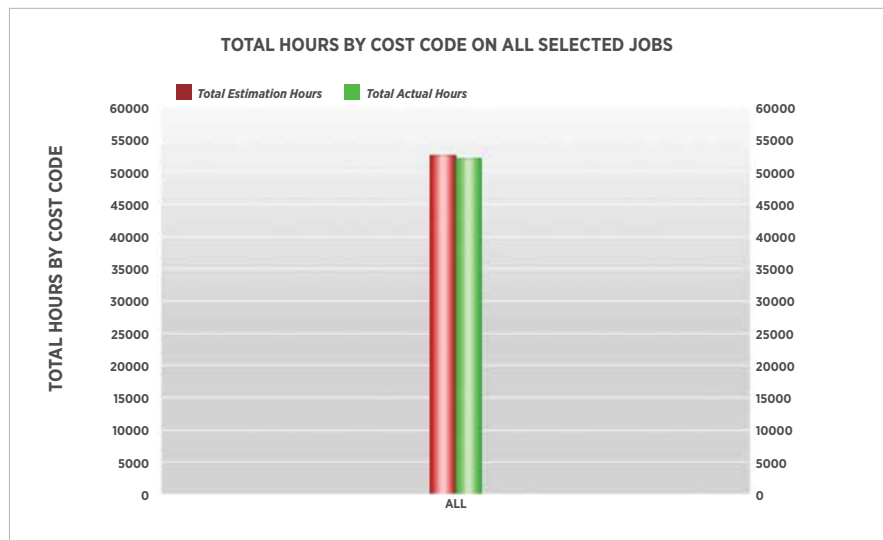
TOTAL HOURS BY COST CODE ON ALL SELECTED JOBS

Figure 3: The job level comparison of hours used versus hours estimated does not show the entire picture.
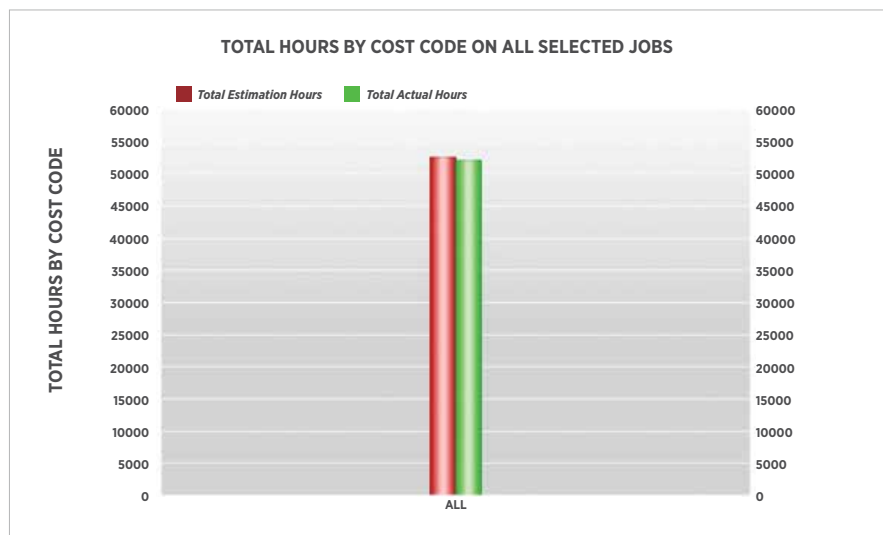
TOTAL HOURS BY COST CODE ON ALL SELECTED JOBS

Figure 4: Breaking down Fig. 3 into cost codes give a more detailed picture of the company's performance.

and statistical outliers will skew the results, ensuring inaccurate bids. To use the available data correctly, one must consider factors such as geography, cost code mix, allowance for pre-assembly, and type of construction. This allows you to make confident decisions based on more than just averages.

For example, if an estimator looks at how a job turned out, he or she may see something like Figure 3, where the job was completed in fewer hours than were estimated. However, a closer look at the individual cost code in Figure 4 shows that the job's "average" hours do not show the entire picture. Some cost codes were underestimated, while others were overestimated. If your next estimate has a majority of hours in cost code 402, it could turn out to be very profitable. However, if your next job up for bid is one with a lot of hours in cost code 302, you could be facing a killer job.
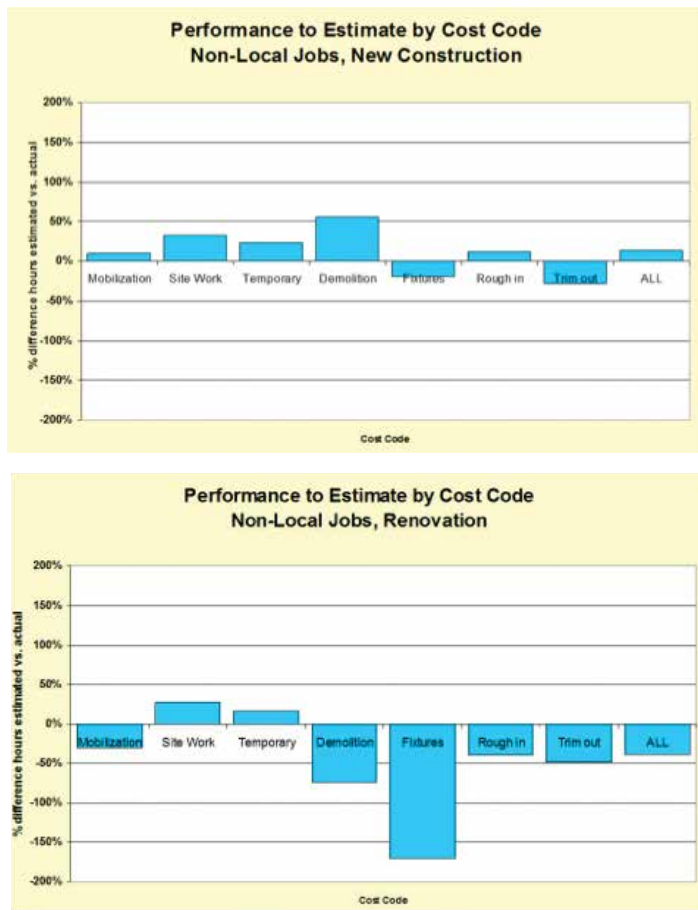
Figure 5: Additional factors, such as location and type of construction, can impact labor performance from job to job.

job tight. If the estimator does not pay attention to past history, his 30% labor overage could turn into a loss of 170% in the case of a renovation-type project, putting him in a no-win situation.

As you can see, averages of prior jobs do not provide a clear picture of what happened between the estimate stage and closeout stage. The first step for improving estimation accuracy in situations like these is to compile and analyze historical data by cost code and specific job characteristics. Once this type of data analysis is established, your estimators will be on the fast track to more accurate estimates and profitable bids.

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Beyond cost codes, jobs can also be compared with certain characteristics, such as job location, type of work, customer type, and contract type, to name a few. For example, Figure 5 shows the same cost code comparisons across several jobs, revealing significant variation in labor productivity depending on the location and type of work. Using data that accurately represents

the work environment adds the most detail to the estimation process and allows for more selective bidding.

Going back to the previous example, let's say this contractor performs poorly on fixture installation projects (average of 30% over budget on hours used versus estimated hours), but is now interested in taking a risk and bidding his next

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BID