Determining Labor Productivity Rates

by Bob Kovacs

I recently asked the participants in jlconline's Estimating and Takeoff forum what part of the estimating process was most difficult for them. The nearly unanimous answer was "estimating labor costs."

Labor costs are harder to estimate than the costs for materials and subs. It's possible to calculate the material and sub costs for a job, then make a wild guess about how many days it will take your crew to do the work. I know contractors who make a good profit doing it. However, this method is just as likely to produce a loss. The best way to estimate labor is to develop productivity rates for the work your company self-performs. You can do this by analyzing data from time cards (for more on time cards, see "Tracking Your Time," 6/02).

Analyzing Time Card Data

Before explaining how to develop the rates, I want to dispel the myth that it's impossible to apply time card data because carpenters perform many different tasks per day and no two days are alike. It may be difficult, but it is not impossible. The trick is to base the rates on data from "good" days and then adjust the rates to fit the project you're estimating. This means using a productivity adjustment factor that's based on how much longer things take on "bad" days.

For an example, let's pretend your crew, Jim and Ted, are going to trim out the interior of a 1,000 SF addition. When the work is done you review the time cards and notice that productivity varied and that you can't always tell how many hours were spent on each task. A summary of the time card data is found below.

The good days. What can we tell from this breakdown? Let's start with the "good" days, where the crew did not have to shift from task to task.

Monday

✓Receive material delivery and spread doors and trim: 6 man-hours

✓Set up miter saw, compressor, etc., and start layout: 3 man-hours

✓Hang and case 6 doors: 7 man-hours

Tuesday

✓Hang and case 9 doors: 8 man-hours (one man out sick)

Wednesday

✓Hang remaining doors (4), trim 8 windows, start base (50 lf): 16 man-hours

Thursday

✓Install 240 lf of base: 6 man-hours

✓Install 100 lf of crown: 10 man-hours

Friday

✓Adjust doors, touch-up corners, miscellaneous pickup, take down tools, etc.: 4 man-hours

On Tuesday Jim hung and cased 9 doors by himself in an 8-hour day. The resulting productivity rate is 8 man-hours / 9 doors, or 0.89 man-hours per door. For simplicity I'd round it to 0.9 man-hours per door.

On Thursday it took the crew 6 hours to install 240 lf of base. This works out to 0.025 man-hours per lf. For simplicity, I'd call it 2.5 man-hours per 100 lf.

On Thursday it took the crew 10 man-hours to install 125 lf of crown. That works out to 8 hours per 100 lf.

The bad days. Now let's look at the other days. On Wednesday the crew worked on three different things but did not break the hours out by task. There are two ways to fix this problem. You can subtract the amount of time the doors and base should have taken based on the calculations performed above. That would leave you with the approximate amount of time it took to trim the windows. Or, you could ignore the data from that particular day and track window trim the next time you do it. You don't have to analyze the data from every single day.

During the week 13 hours were spent receiving material, setting up and removing tools, and on miscellaneous tasks. I refer to this as "setup and takedown" time, and I could spread it across the other tasks. However, it happens on every job and hardly varies with the size of the project. I prefer to carry it as a separate line item in the estimate.

Variables to Productivity

Say you had data from four different projects that involved hanging doors. In the example above it took 0.9 man-hours per door. How do you explain it if the same crew shows rates of 0.85, 1.2, and 1.3 man-hours on the other three jobs? Odds are there are some

underlying factors that affected productivity. Maybe the framing was absolutely perfect on the project where it took 0.85 hours per door. The job where it took 1.3 hours per door might have been in an existing building with plaster walls that varied in thickness and weren't even close to plumb. To make matters worse, there was no room to store the doors inside so the crew had to haul them in one at a time from a distant garage.

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In the first case, the 0.05 hours saved per door was due to the extra good job done by the framer. On the 1.3 hour example, the true time to "hang the door" was probably around 0.9 man-hours, but the extra walking and carrying added 0.4 hours per unit. So how do you account for these factors? It's too complicated to carry different production rates for "hanging door," "hanging door in perfect framing," and "hanging door when wall is messed up and door is stored far away."

Productivity Adjustment Factor

A better solution is to develop a rate for a "typical" installation and then apply a productivity adjustment factor. The factor is just a multiplier. If you think the project will be a nightmare, you could multiply the standard rate by 1.3 or 1.5.

The multiplier is based on the kind of work you normally do. If you're a remodeler, most remodeling tasks will have a factor of 1.0. If your numbers are based on doing new construction, remodeling work will have a factor of more than 1.0.

The productivity factor will usually be between 1.0 and 1.25. It will only be more if you land an unusually high-end project or are working on something that's a real mess. In those cases, you might use a factor of 1.5 or 2.0. If a task requires such a heavy multiplier, it may be different enough to have a productivity rate of its own.

It's probably too laborious to apply the factor to individual tasks. It would be easier to apply it to the entire project but that might not make sense either. For example, the difficulty of trimming the existing structure may slow the carpenters down but it will have no effect on the subcontractor who's forming a foundation for the addition. It's probably best to apply the productivity factor by trade.

On a tight-access addition, the excavator, mason, and framer may get a 1.25 multiplier, while the inside trades get none. If it's a cut-up interior, the framer, drywaller, and trim guys may get a 1.15 multiplier, while everyone else gets none. In my experience, framing and plumbing require the highest multipliers, especially in old houses. The frame could be out of plumb, the lumber could be an oddball size, and the existing pipes could be crumbling and about to break.

In the beginning, your productivity factors will be an educated guess. As time goes on you'll develop a feel for when to use a multiplier and how big it should be. Once you put together the basic estimate and decide which parts to apply the productivity adjustment factors to, it's simply a matter of breaking out the labor and doing the math.

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