

New Method Tested To Sharpen Work Measure

03/31/2010

By [Bruce Buckley](#)

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Large contractors are putting a new standard for productivity measurement to the test in the hope of producing better project process controls. The new standard, which was adopted last fall as ASTM E2691, focuses on methods for continuously measuring productivity losses to allow for corrective actions during a project.



Measurement system promises better project information on productivity.

Perry Daneshgari, a management consultant based in Flint, Mich., who developed the standard in conjunction with the National Institute of Standards and Technology (NIST), says the standard measures work performed compared to construction-put-in-place. Daneshgari says companies often are mistakenly “measuring production, not productivity.”

“People tend to do an economic measurement, looking at labor hours versus dollars,” he says. They are “two sides of the same coin. Unless you measure against actual completion, you’re not measuring productivity,” says Daneshgari.

Many existing accounting measures, such as earned-value analysis, are “after the fact” reporting methods that don’t offer information for improving productivity as a project unfolds.

Dubbed “Job Productivity Measurement,” the method was born out of Daneshgari’s work in the automotive industry in the 1990s. One of his studies at the time found that one U.S. automaker produced 73 vehicles per hour, while a Japanese competitor produced 55 per hour. Although the U.S. firm produced more vehicles, 32% had to be repaired for quality reasons before being shipped. The Japanese firm’s vehicles needed almost no repairs and as a result their labor costs were nearly half those of the U.S. automaker’s.

Daneshgari saw similar issues in construction—rework saps productivity—and he began adapting automotive process controls to building projects. To date, Job Productivity Measurement has been used largely by specialty firms, particularly electrical contractors. However, Turner Construction Co. currently is wrapping up a pilot project using the measure on an office-building project in Redmond, Wash. Other major contractors are investigating the method.

The use of lean construction, the manufacturing system that involves continuous measurement and improvement, is leading contractors to look at methods like Job Productivity Measurement, says Chris Heger, project superintendent with Turner.

“If you’re going to go down the lean path, you need to be able to measure it,” he says. “We’re looking for a mathematical approach that provides data to back up some of the things planners have known for a long time.”

Turner chose to test Job Productivity Measurement on the Redmond project after the owner asked for the schedule...

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...to be reduced from a year and a half to one year, Heger says. Crews met the revised schedule for the four-story, 393,897-gross-sq-ft Class-A office building, delivering it 356 days from the issuance of the building permit to the certificate of occupancy.

In addition to mandating that the major systems and structures be designed using building information modeling, Turner worked with its subcontractors to create work breakdown structures, which were used during buyout. Heger says the breakdown structures provided ample transparency to promote coordination efforts, while also allowing subs to retain confidential accounting and business practices.

Schedules were broken into short intervals to help the team stay on top of issues and keep tighter control on processes, such as the movement of materials. Heger says the team took an “assembly-line approach” to the job, focusing on the most predictable aspects of the job and tightly scheduling them.

“Construction is a highly variable business, but sometimes we focus too much on the variability and not what’s a constant,” he says. “Weather, soil and the people are variables, but a lot of other aspects don’t change. Those constants are what you want to focus your maximum effort on and make as effective as possible.”

On the Redmond project, crews erected 2,310 pieces of steel in 91 hours over a 10-day period, and 95,000 sq ft of elevated deck was completed in 11 days. Average productivity was \$48,000 per man-month; it had been estimated at \$28,000. “That’s what’s most impressive to our VPs,” says Heger.

The process also reduced costs. The electrical contractor came in 15% under the original budget, with no additional costs for schedule acceleration. No claims resulted, and contingency wasn’t used.

Robert Chapman, a NIST economist, says that although Job Productivity Measurement has proven particularly effective for subcontractors, it can be a helpful tracking tool for general contractors as well.

“It’s a generic process control mechanism that is particularly helpful in allowing a construction firm at the project level to look at how they are performing against what their predictions were when they bid the job,” he says. “Because it’s generic, the GC can use this standard on a job and have all the subcontractors adopt it. That way, you’re tracking the subs and the overall project better.”

Simply put, Job Productivity Measurement compares the percent of allocated hours used vs. the project’s percent of completion. If a 400-hour job is 50% complete but more than 200 hours have been used, the project is behind schedule. Every kind of work—including prefabrication, pre-assembly and commissioning—must be counted. It’s not just turning wrenches.

Chapman predicts that this is the first of several productivity standards to be adopted in the coming

years. Although the published Job Productivity Measurement standard is brief, he expects appendices to be added over time to illustrate the technique in greater detail.

The new standard strikes at looming concerns over lagging construction productivity. In July, the National Research Council released its "Advancing the Competitiveness and Efficiency of the U.S. Construction Industry" report, which called for widespread adoption of lean techniques, integrated teaming, and virtual design and construction to help improve productivity. The study also noted the need for improved metrics for benchmarking performance.

Last fall, members of the Construction Users Roundtable discussed plans to partner with NIST on productivity initiatives. Bob Volkman, senior consultant with CURT, says company-level and industrywide productivity benchmarking are critical concerns for owners.

"We see productivity measured at the project level, but what's non-existent is seeing how we are doing as owners against the industry," he adds. "That's the missing piece."

Some groups are attacking the issue, including the Construction Industry Institute with its "Benchmarking and Metrics Database" initiative.

Chapman says that Job Productivity Measurement in its current form is most effective at the task and project levels but has the potential to rise to an industrywide level over time, if sufficient data is collected and shared.

"Right now, I see JPM as an effective early warning system on projects," he adds. "There is the potential for more, but for now it's a step in the right direction."

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