



363 E. Grand Blanc Road
Grand Blanc, MI 48439
Tel: (810) 232-9797
Fax: (810) 232-9746

www.mca.net

We make your company more productive by applying: Lean Engineering, Manufacturing, and Service Processes

Making Productivity Visible to Everyone®

We are about you!®

What it takes to be a Project Manager

IEC Article Discovering Project Leaders

By Dr. Perry Daneshgari & Dr. Heather Moore

Say your boss, the owner or CEO of the electrical firm you work for came to you with some exciting news. He offered you a 500,000 hour job to manage. Of course your boss was excited. The job he just handed over to you will bring in approximately \$65 million over the next 4 years. You, on the other hand, although excited, were shaking in your boots just thinking about it. In the past twenty or so years of working for this firm and the three firms before it, the largest job you ever managed was 200,000 hours and you almost lost your shirt. That job was well on its way to becoming one of those “killer jobs,” the kind that everyone in the industry talks about for years. Now you’re about to look down the throat of a beast that can either make you, or sink the company you work so hard for and take everyone down with it.



Figure 1

A million things rush through your head all at once just from the thought of facing such an animal. You don’t want to let your boss down, or the hundreds of contractors that will be under your wing, all of which have been desperate for work to come their way this past year. You put on your happy face, thank your boss for the opportunity and assure him that “you got this.”

As you walk back to your office you start to reflect on what contributed to saving that “killer job” you once had. You think back to all the project management classes, the prefab classes, and the Agile Construction® classes that you took that year. You pull a book from your bookshelf called Agile Construction® for the Electrical Contractor and blow the dust off. *It worked back then*, you thought to yourself, *and it will work now too*. Without hesitation you get right to work on a job of a lifetime.

Even though, a large job is nothing but a lot of small ones, managing it requires comparable skill and know-how as managing a very large company. Issues such as management of:

- Resources — in this case, an unknown labor force
- Schedules
- Purchases
- Billing and cash flow
- Productivity
- Subcontractors
- General contractors
- Turnover
- Substance abuse
- Cost
- Lack of visibility at the task level
- Coordination with other trades
- Material price escalations
- Job-site logistics, including tool and material movement

become uncanny and require a different level of feedback, response and agility to the day to day events. The required tools for management and mitigation of the technical, business, and integration risks have to be in place, trusted, and used if you want to safely navigate the difficulties of such work. In addition, plans for organizational structure, reporting structure, information flow, and other elements must be made. Although the tendency of many contractors is to treat this type of project as “a typical job,” this mindset can lead to major problems and financial loss.

A \$65 million electrical project stretched over four years is about a \$16.25 million dollar project per year. The difference on this size of a project is that the supporting infrastructure has to be shared with all other projects running simultaneously in the contractor’s operation during those four years.

To set up this size job for daily, weekly, monthly and annual management in addition to the traditional project and cost tracking tools, you have to set out to add quality and integration tools to assure continuous monitoring and correction during the job progress. Mitigation of the risks has to be clearly divided between:

1) *Technical risks*, which are electrically driven, such as: code; inspection; design (including architectural, structural, and MEP systems); installation requirements; durability testing and QA/QC; contamination testing; electrician’s knowledge; as-builts; and submittals. The above risks can be managed with industry-standard procedures, processes, and tools.

2) *Business risks*, which are monetary in nature, such as: invoicing; timesheets; material purchases; subcontractor’s payments; bonding; insurance; change orders; cash management; project organization structure and personnel; and profitability. The above risks can be managed with existing business and financial management systems.

3) *Integration risk*, which is defined as bringing and aligning all of the pertinent elements needed to install the job, such as manpower, material, and money.

Integration risk is the most critical and unknown factors during the progress of any large or small project. Any mishaps at the intersection of manpower, material, and money are due to integration risk. These included but are not limited to:

- Coordination with other trades for design, layout, and physical work space
- Scheduling of work
- Reporting on work and quality of work
- Response to changes onsite
- Material problems, including logistics, and lay down areas
- Managing requirements of the daily work, the entire project, the company

Work Environment Management (WEM[®]) is a tool used to manage the integration risk throughout a project. WEM relies primarily on usage of the newly developed ASTM standard for construction “Job Productivity Measurement (ASTM E2691)” as a feedback mechanism.

Starting with the project schedule, the following elements of integration must be set in place:

- General’s scheduled-plan (GSP)
- Work breakdown structure (WBS)
- Job productivity measurement
- (JPM) — Set up, usage, and reporting
- Electrical scheduled-plan (ESP)
- Three-week look-ahead scheduled plan
- Short interval scheduling (SIS[®]) — set up, usage, and reporting
- Change management process and protocol.

Due to the size of this project, one of the first elements of WEM[®] that should be used is a process called Work Breakdown Structure (WBS) (**Fig 2**). This helps the project team see the project from the vantage point of the true work. By putting together a WBS, the job becomes visible and manageable in smaller sections. Once the WBS is created, the JPM baseline can be established, and the project manager could then track jobsite productivity on a weekly basis through JPAC[®] (**Fig 3**), a computer-enabled process designed to measure, predict, and improve job site labor productivity for contractors.

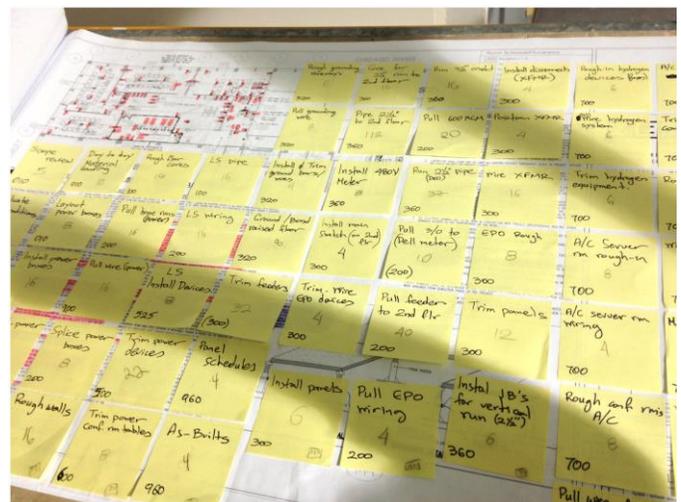


Figure 2

In addition to JPM, establishing SIS[®] tracking will be crucial, because it would be physically impossible to know what obstacles over 100 electricians will encounter on a daily basis (**Fig 1**). The project will start with a handful of lead electricians set up using SIS[®]. However, as the project grows and

becomes more complex, the project manager can then decide to expand the usage of SIS[®] to even more managers. Each will provide input on their crews' ability to finish scheduled work on a daily basis, and what was getting in their way of doing so.



Figure 3

SIS[®] input can determine if they were common absences or if they were issues causing the absence that needs to be addressed.

In addition to weekly reviews of productivity trends and obstacles, you can begin using the original WBS and weekly input from the JPM observed % complete to develop an electrical scheduled plan (ESP) that coincides with the General's scheduled plan (GSP).

Conclusion

Running a large project is not unlike running a company, with the difference of pace and the amount of risk involved in one large undertaking. The technical and business risks alone on this size of a job need to be planned and managed with the company's good people and proper procedures. However, the integration risk is the largest unknown and has the fewest tools available in the industry to manage. Setting up the WEM[®] tools and measurements is a first step to making this risk visible, and if it can be measured, it can be managed.

With the JPM and SIS[®] tools in place, the job will be visible for tracking the special and common causes of variation on the project's overall productivity. A weekly review of both measurements will involve the project manager, senior project manager, and the director of operations. At which time the SIS[®] outputs will be reviewed to determine what obstacles are causing daily ups and downs in scheduled work. The overall job's Pareto Chart (Fig 4) of obstacles will show total scheduled hours of work and how they are impacted by obstacles. In the past, large jobs were plagued by absenteeism, the number one cause of not getting work done as scheduled. This will be expected even more with this crew size. However,

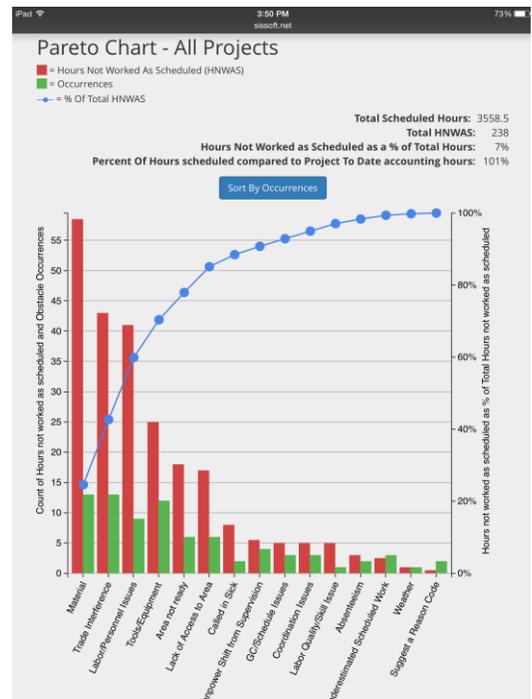


Figure 4

Dr. Perry Daneshgari is the President / CEO of MCA Inc. MCA Inc is a research and implementation company that focuses on implementing process and product development, waste reduction and productivity improvement of labor, project management, estimation, accounting, and customer care. He has also published four books and an ASTM Standard for Job Productivity Measurement.

Dr. Heather Moore is Vice President of Operations for MCA Inc. She holds a Ph.D. in Construction Management from Michigan State University. Additionally she holds an MBA from University of Michigan, Flint, and a B.S.E. in Industrial and Operations Engineering from the University of Michigan, Ann Arbor. She was a contributor for the ASTM Standard E2691 “Job Productivity Measurement” and also was co-author of the newly published ASTM book “Application of ASTM E2691 Standard Practice for Job Productivity Measurement in Agile Construction[®].”