

Estimating **JOB COMPRESSION**

by George Hague

How long will the job run? How many labor resources are needed? There is an optimum duration and crew mix for every project, and the estimate must consider the cost of the project and the individual contractor's ability to supply labor resources. Since any deviation from the job schedule invariably involves additional expense, it is vitally important for the estimator to know how to calculate the extra costs due to job acceleration. This information is frequently used to substantiate legitimate claims for additional compensation.



Electrical contractors rarely analyze the effect of accelerated job duration and generally estimate work according to the time in hours the job will take to complete. It takes more, however, than just accurately estimating direct labor for a successful estimate. Experience and labor cost studies have taught us that when the job schedule is accelerated, the end result is greater job and labor costs. In most cases the electrical contractor does not have complete control of the work environment and is subject to delays caused by the workflow of other trades and the numerous other influences that affect job progress. Unfortunately, delays happen and the standard procedure is to complete the work in less days.

Consideration must be given to the effects on job duration from weather, labor market, efficiency of the general contractor, job conditions and the other subcontractors involved in the project. Delays naturally force acceleration of the later project phases. Too often, allowances for compression of the work schedule are based on a superficial study of previous like jobs and past experiences. Having a sound method of estimating costs due to job compression can be a great benefit to contractors.

BIDDING PROCESS

When bidding projects that historically result in compressed schedules, the electrical contractors' best protection is to prepare the estimate based on the project's published construction duration period. If the bid documents do not specify job duration, request this information prior to presenting the final proposal. Include in your proposal a schedule of crew size for each phase of the project. Build a schedule that is realistic by calculating the actual number of workdays allowed by the project specifications start and finish calendar dates. When calculating workdays, remember to adjust for weekends and holidays when work is typically not scheduled. The project's construction duration is paramount when determining crew size requirements. There are computerized programs available that can help you develop this information.



All estimating applications of substance should link to MS Projects, Primavera or ConEst JobTrac. All three applications provide the tools to develop the required data. It is the estimator's role to anticipate the job requirements and calculate the labor demand.

EFFECTS OF JOB COMPRESSION

All of the procedures that go into a basic estimate apply when estimating job compression. Acceleration caused by change orders and missed project milestones result in loss of productivity. The ripple effect must be compensated for in the estimate. There are at least five cost considerations we will address here that impact the estimate.

Overtime or Shift differential: An accelerated basic contract, for the most part, requires overtime hours. The affects are premiums that must be paid. In most cases this premium is time and one half the regular hourly rates; in some cases it will be double the regular hourly rate. The contractor might consider a second shift in lieu of overtime. By scheduling shifts, the overtime premium costs may be reduced. Evaluate both solutions to determine the most effective method to implement. Remember, creating shifts requires additional mobilization of labor resources and unless the resources are readily available, will require borrowing from other projects. The downside of borrowing is the disruption of productivity to the other projects.

Overtime work affects labor costs far beyond the overtime premiums. Overtime schedules for prolonged periods substantially reduce productivity per hour worked because of physical fatigue and mental attitudes of workers.

Stacking of Trades: Delays and changes to a project always result in a continuing deterioration of the original contract schedule. What was planned as an orderly sequence of work becomes chaotic and disruptive. The typical remedy is to throw additional labor resources and crews on the job. Trades become stacked within a physically restricted area thus

reducing the capability of all to work in an orderly and proficient manner. This disrupts the basic contract cost for the work and is one of the chief causes for contractor losses on construction projects.

Reassignment of Labor Resources: When current work in progress is unexpectedly disrupted by a demand to expedite the completion of certain phases of work, this normally results in moving and adding resources to the accelerated tasks. There is a ramp up time for new resources to come up to speed with job conditions and requirements. Productivity loss occurs because there is no opportunity to plan an orderly effort and proceed smoothly and efficiently.

Crew Size Inefficiency: Productivity is directly affected when it becomes necessary to mobilize additional labor crews or individual resources. One element of loss occurs during the mobilization process and while the resources become oriented to the job. Overloading of resources is another element that lends itself to inefficiency. Remember, every project has an optimum crew size and placing more employees on a project can actually reduce productivity. As a general rule, the larger the crew size the lower the production rate. It has been said that a job that will take an electrician one hundred hours cannot be done with one hundred electricians in one hour.

Material Handling: Procurement and delivery of materials, equipment, etc., are affected by job acceleration. Timing is essential to maintain maximum productivity output. *"The right material in the right quantities on the job at the right time"* is not a saying to be overlooked.

CALCULATE COMPRESSION

Your job cost records can quickly give you an idea of which types of projects and contractors cost you more. If a contractor inadequately executes schedules and lacks good, progressive project management skills, you'll bear the losses. A contractor that delays the project and runs up the cost should pay more for your services. Study the results of your previous projects so you can identify offending contractors!

From job costing figures, examine similar type projects to determine the percent of compression. This should be divided by type of job and contractors. Look for areas that required unscheduled overtime or phases that were overloaded with labor resources in an attempt to accelerate the schedule. Subtract the total of all compressed task estimated hours from the total of all compressed task actual hours. Determine the percentage these additional hours represent to the total project by dividing the additional hours by the total job estimated hours times 100.

$$\frac{A - B}{C} \times 100$$

Total all Compressed Task Actual Hours
Total all Compressed Task Estimated Hours
Total Job Estimated Hours

Now apply this percentage to your current estimate to increase the total job hours and compensate for compression.

In summing up all the costs, we find that the predominance of the expense consists primarily of labor. The supply and management of labor are the major functions of electrical contracting. The principal cost of doing business is made up of services designed to expedite labor resources. The supply of material is only a secondary cost of contracting. Typically when an electrical contractor experiences loss on a project, it can be reduced to underestimating labor. Understanding how to anticipate and compensate for costs incurred by job acceleration will reduce your risk of loss.

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