

Independent Control Specialists Inc.

**PLan Users Guide (PLUG)
For Facility Automation Contractors**

This guide offers some ideas and concepts that may be of interest to contractors, specifically to those who operate in the area of building automation (in the broadest sense), but also to others in related fields. These concepts are woven into and supported by the ICS software tools (Concerto Suite estimating and Cosmos design/submittal).

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A. PROJECT COST CONTROL

A key goal of Project Cost Control is the successful management of the resources expended to achieve a completed project installation. Job Planning is a key element of Project Cost Control; and to fully discuss Job Planning, it is necessary to deal first with the overall subject of Project Cost Control.

This document deals with "Facility Automation" which includes Building Controls, Access, Fire, Security, Intelligent building, and similar disciplines characterized by high-tech knowledge workers.

PROJECT COSTS

Only a profitable organization can remain "on the scene", and employ qualified people in rewarding positions. A company can only continue to re-invest profits if it employs a PROJECT COST CONTROL system that provides to the company employees a framework to effectively control expenses on contracted work.

Project cost control may be broken down into these categories

- material cost control
- miscellaneous cost control
- subcontract cost control
- labor cost control

Each of these elements makes up a significant portion of contract costs. To control "costs" you must have the means to know quickly what the cost should reasonably be, when the costs exceed the expected numbers, and find ways to pro-actively change a problem situation before it's too late.

Obviously, each of the cost CATEGORIES can be further broken down in smaller ELEMENTS. For instance, 'material' may consist of several sub-categories or 'elements' such as Automation products, Software, Pneumatic, Electric.....

In the following pages, it will be shown that each cost category should be looked at slightly differently as related to cost control, what to do, and when to do it.

The common element in the control of all the cost categories, however, is PEOPLE getting a handle on what the costs SHOULD be, (by predicting, estimating and planning), and then Controlling the actual events through proper ACTIONS in such a manner as to meet or exceed the expected profit TARGET.

BASIC PRINCIPLES - BUILDING AUTOMATION VERSUS OTHER CONTRACTING

The principles of project control are believed to be well known and adequately documented for the general Construction Industry.

Many words have been put to paper over 'Project Control', 'Project Management', 'Cost Control', etc.. The sheer volumes of work directed at these subjects should give a clue regarding the perceived importance of these subjects, or more accurately, the importance of their benefits.

Some success has been achieved by selected companies or people in unrelated Contracting fields, but you must be cautious before importing practices of a different business without examining their chances for success in your own business.

For indeed, the Mechanical or Electrical contracting industry is not identical to our own. They can often act as brokers, and 'subcontract' labor risk as much as possible, even though their scope is typically better defined in plans and specifications. The high-tech scope of Automation is often less clearly defined, or vague and open to interpretation – and this is not necessarily by accident. To be sure, there are a number of steps and principles that apply to our business as well as theirs. However, there are important differences related to the amount of control, size of job crews and contract amounts, that cause our needs to be somewhat different. Also, the amount of direct supervision given to installation personnel in the control industry may be lower than in the traditional contracting trades.

But although much has been written about "project control", the attempts to apply the lofty theories have not always been rewarded with great success. Throughout the Building Automation Industry, many examples can be found of projects gone sour.

So, in addition to the construction industry's "standards", specific techniques may apply to our business.

In several instances, the 'Building Automation Industry' has approached the issue of Project Cost Control in a 'Scientific' manner, from a standpoint of 'By-the book' job planning and detailed cost control.

The principles applied were basically those of the early-1900's FORD MOTOR ASSEMBLY LINE theories. These theories did, of course, work at one point in time, and under certain conditions. Different tools are available to us to-day, and our business problems do not really lend themselves to 'assembly line' solutions.

Hence, the methods ICS seeks to suggest, are quite different from Henry Ford's methods.

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A WORD ABOUT ESTIMATE QUALITY

Even under 'Good Estimate' conditions, financial failures may still occur that can often be traced to the lack of effective cost control by the 'project execution team'. (no pun intended)

On the other hand, under 'Bad Estimate' conditions, often a project has been successfully managed by the 'execution' team, and the contract's financial outcome was better than anticipated. However one must immediately draw attention to the fact that a project's financial failure, or at the very least financial hardship, is virtually assured when the cost predictions (**estimates**) are unrealistic. This falls in the category of "making a silk purse out of a sow's ear".

On the other hand, within a certain degree of reasonableness, project profitability can be achieved regardless of a 'slightly' defective estimate.

We'll define the category of '**Reasonable Estimates**':

A Reasonable estimate is one which is 'accurate' in its count of the quantitative cost elements such as devices, installation materials and lengths of pipe, conduit and wire, and has 'sensible' assumptions made about the intangible cost elements such as risks and labor contents.

'ACCURATE' can be defined as precise, without errors, and in the context of our estimates, is easily understood by all.

'SENSIBLE' is taken to mean that careful, realistic judgment based on standards and the estimator's or other person's experience be made when considering the likelihood of the risks or labor content involved.

(The term REALISTIC is used as it relates to PESSIMISM or OPTIMISM, both of which terms are enemies of all 'reasonable' estimates)

Reasonable estimates, as described above, may be neither "Accurate" nor "Correct" in the sense that they do not represent the ONLY possible solution, but they are 'DO-able' without causing excessive stress or being overly 'easy' to accomplish.

When estimates are 'Reasonable', a good 'Execution team' will have an opportunity to meet or even exceed the estimated profits, through the application of sound project and cost control measures. However, failure to use proper measures may still result in financial failure.

It is the goal of this Plan Users Guide ("PLUG") to initiate people in the proper application of these control measures, in order that they may meet cost objectives.

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GOOD VERSUS BAD PROJECT CONTROL

GOOD project control is, quite simply, SUCCESSFUL project control.

While any attempt at project control is likely better than none at all, there are vast differences in success rates, depending on the methods employed. The complexity, size, and other project-dependent factors have their own effect on the methods employed, and their relative success.

What differentiates successful project control methods from the less successful ones?

First of all, it's NOT technology, computers, or the like. There were many projects brought to successful completion long before these tools appeared on the scene. These tools can, however, play an important and beneficial role in the control process.

Also, it's apparently not a 'be TOUGH with your people' approach that is the key factor. All kinds of different management styles seem capable of weathering the construction storms.

There are many things that do NOT promote project control, although they may have positive or negative influences on the success of the installation or contract.

The basic secret ingredient of effective project control, it seems, is rather subtle.

The word 'CONTROL' is defined in Webster's 1904 edition of the "Twentieth Century Dictionary of the English Language" as

To exercise such an influence over (something) as to guide, direct, manage, or restrain (it); to have under command; to check.

... Much has changed since 1904, but those basics remain intact.

The secret ingredient: 'CONTROL' is a PRO-ACTIVE activity. It implies that an **influence** is exercised that positively affects the outcome. This means that the person seeking to control a project must take ACTION based on a well reasoned plan, as opposed to REACTING to events **after** they have happened.

Notice that the definition does NOT refer to any form of 'historical' comparison of what happened versus what was expected; or actual versus estimate. Those are immaterial for 'control' to happen.

[The difference between successful and unsuccessful project control, is that SUCCESS comes from the PRO-ACTIVE nature of the methods employed. Influence is exercised ONLY if an action plan is established BEFOREHAND, and progress monitored against the established standard.](#)

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PROJECT CONTROL BASICS

The following are suggested control basics to live by in 'our' company:

- ESTIMATING is **PRE-ACTIVE**; it has to do with anticipating and predicting of what **WILL** happen or what **COULD** happen. It often relies on past knowledge and experience.
- PROJECT CONTROL has to do with the **PRO-ACTIVE** discipline of **MAKING** things happen. You know the desired outcome, and that guides your actions.
- M.I.S. REPORTING (Management Information Systems, or Accounting) has to do with a **RE-ACTIVE** discipline of reporting what **DID** happen. (History).

This PLUG guide is intended to deal with the principles associated with the Pro-active discipline of Project Control. However, there is a **RELATIONSHIP** between estimating, project control, and MIS cost reporting, which makes each one dependent on the others in a synergistic way. That means, none of the three disciplines can really stand on its own; together, they produce a larger effect than the sum of the individual parts would seem to indicate.

A WORD ABOUT PEOPLE

The three disciplines will be successful only if they are felt and believed and lived by the people involved.

It turns out that a mechanical kind of 'system' has only a small chance of success if it is not understood, supported and defended by its users. And without true management support, any 'system' is doomed to failure.

MATERIAL COST CONTROL

The job design format should be the same as, or similar to, the job estimate format. If very different, it would mean that tasks were unnecessarily repeated, and that there may be a disconnect between sales and operations disciplines. The successfully detailed estimate breakdown, typically by geographic areas or other installation segment related building area factors, will produce discrete blocks of costs and labor hours data that can be used directly in the job labor planning process.

The Design / Project Engineering team is in charge of the actual materials ordered, i.e.

- are they going to do the job technically
- are they cost effective on an installed (LABOR taken into account) basis
- are they known (standard, proven, used before) equipment
- are they priced competitively (versus estimate or other choices)
- are they available economically (i.e. easily purchased without administrative nightmares)

MATERIAL STANDARDS ARE AN IMPORTANT KEY

To achieve consistency of operations and credibility with a customer base, it is crucial to do everything reasonable to standardize on the optimum material choices. 'Optimum' refers to a proper combination of quality, first cost, installation (manpower) cost, and warranty cost combined. However it goes a lot deeper than that. Once a certain product is accepted as the 'office standard', then all sorts of benefits can fall from this decision. Sales people know what to sell, designers know how to engineer it correctly and where to purchase it, field people know how to install, adjust and program it, spare parts are easy to obtain, and customers know what to expect.

This also implies an effective Material Follow-Up process: who selects the devices, who buys them and when, what is the order process, what is the receipt process, what are the rules for storing the materials until they are needed? Can you order and get paid if the material is on site, what is on-site security like, what is the rule on 'borrowing' materials from another project, who looks after delivery follow-up and how, etc.

After the design process, 'operations' is responsible to perform a material-and-labor cost review (engineered or as-designed estimate) on the job, to ensure that the Operations team saw the job similar to the Sales team. ICS Concerto Suite tools produce these re-estimates without undue effort or delay.

The design and engineered estimate processes typically consist of a modification of the sales estimate, using the same guidelines, but allowing for the ACTUAL (as designed) equipment, installation material (scaled tube/ conduit/ wire runs) and associated labor costs and assumptions.

A detailed **labor plan** follows naturally from this process, since the estimating (as-sold) AND re-estimating (as-designed) system drive the labor hours on an 'area' basis, which is the basis upon which the field labor can be measured and controlled. ICS Concerto Suite can export the detailed labor tasks to MS Project, thus eliminating the time consuming task of breaking down a project in its measurable elements.

NOTE :

We strongly suggest that Design Engineering personnel should be the ONLY people allowed to process orders for EQUIPMENT (devices) to be charged to a job. Violation of this rule introduces corruption in the project cost control integrity.

Equipment purchases are subject to review/approval:

- Sales people **MUST** be notified if the equipment purchase price exceeds the estimated cost, OR if a change in labor cost may result from different devices used. Operations should print, use, discuss with Sales, and file in the (paper or electronic) job file, a material cost estimate deviation report.
- PM (Project Manager) review of competitive bids (if any) for purchases, and purchases of items NOT standard.
- PM's should be the only people allowed to approve the purchase of INSTALLATION MATERIAL (conduit, wire, tube, and accessories for same) to be charged to a job. If approved after the initial design is completed, the DESIGNER responsible for the job must be notified for cost tracking and "closing the loop" purposes.

Equipment / material cost control comes down in the final analysis to the following guiding principles:

NOTE - 'Equipment' below refers to 'devices', typically having a manufacturers part number; 'Installation material' refers to tube, wire, conduit, and installation accessories typically bought 'in bulk'.

- estimating is by Sales based on 'qualified' project and customer needs
- design is by Ops/Engineering, within the framework of what's needed, what's sold and best practices.
- re-estimating is by Ops based on the designed systems
- equipment cost is **committed** (and therefore **known**) at DESIGN time (materials selected)
- equipment ordering is done by Operations DESIGN team.
- all installation *material* ordering is monitored or sanctioned by PM's.
- all other (later) activities are related to the **execution** of the order (PO's, payments, receipts) and the reporting of what happened (MIS). No '**control**' happens here!
- NOTHING should be ordered unless it was recognized in the engineered estimate / design. Any items ordered in excess of the re-estimate should be under direct control of the P.M., and must be accounted for in the next Estimated Final Cost calculation, so as to always keep the current Estimated Final Cost accurate.

Adherence to these principles will ensure that material costs are NOT going to be a 'surprise' issue in final job costing.

After ordering of the equipment, installation materials and subcontract, the costs are 'committed' without perhaps the money having yet been paid out to suppliers. The ARRIVAL TIME of these items or the associated supplier invoices does NOT really constitute any real or significant kind of material cost **control**. Therefore large amounts of valuable P.M. time and energy should NOT be expended in pursuit of 'being on top of' these factors except as described above. Of course, material that arrives at the *wrong* time may have an effect on labor efficiency.

IN CONCLUSION, the effective control of **material** costs depends on the very simple principle that if you determine in advance what will buy, and then stick to that plan, the material cost is known.

It must be appreciated that the success of this simple system lies in the strict adherence to the premise that only certain people are allowed to purchase job equipment and materials.

If the P.M. has in his possession a full list of the 'engineered' material and equipment for the contract, then he has at his fingertips a powerful tool to ensure that NO orders are placed except as per the contract drawings which he has approved and accepted.

Borrowing Material

It is true that emergencies occur, and when needed equipment for project A is sitting on a shelf to be used on project B, people will try to 'borrow' this equipment. At the risk of appearing impractical or theoretical, we strongly suggest that this practice be avoided at (almost) all cost. If it must be done, (which it will at times), the reason of the shortage on project A should be investigated and corrected procedurally. The amount of administrative problems and costs, truly a result (in most cases) of sloppy approaches to material ordering and design, should be dealt with decisively.

Borrowing is often a symptom of bad practices and the cure lies in correcting that practice. The administrative costs that follow (material is now missing on project 'B', field work may be held up, rush shipments are expensive, ...) are substantial and can be avoided.

SUBCONTRACT COST CONTROL

The concepts related to Subcontract Cost Control were already covered under 'material' above.

However, where some contractors use subcontracts to do significant parts of the work, it must be recognized that effective subcontracting is a whole separate 'skill' to be mastered.

The basic premise here is that information transferred to a subcontractor must be sufficient in quantity and quality, such that you may expect a professional quote and installation from the subcontractor without later being 'nickled and dimed' because his crew is not productive due to your poor documentation.

This is of course no different than the info your OWN people need to do a proper job. In fact, we suggest that your documents should ALWAYS be good enough to SUBCONTRACT from, whether or not you choose to do so. This implies a quality in the drawings etc. that stands up to the scrutiny of the 'field'. Sometimes, your own people feel they are in no position to complain about the internally produced poor documents. Subcontractors will not only complain, they may demand more money due to inadequate documentation quality.

Subcontract cost control starts with clear, complete information to which the subcontractors (always two or more) can bid. Failure to have a COMPLETE set of 'Bidding documents' will merely result in extras for which you will GET no extra money, but for which you will have to PAY out of your profit margins.

After you select one of the bidders based on price and ability to do the work to acceptable standards and in the necessary time frames, the subcontract document is drawn up, and at this point the COST IS COMMITTED. All remaining activity will result in *WHEN* you pay the bill, (as the work progresses) not *HOW MUCH* you will pay.

(Refer to your company POLICY for the wording and contents of a proper subcontract document)

INSTALLATION STANDARDS ARE AN IMPORTANT KEY

Often we fail to remind subcontractors, or fail to enforce as needed, the use of specified or technically necessary installation materials such as type and grade of conduit, wire, hangers, connectors, panels etc.

We do not always insist (but we *should!*) on the quality of installation as it relates to installation standards. Together with your direction on installation materials used, you MUST have clear instructions for, and expectations of, the workmanship and methodologies used to perform your work. **A low price is not good enough.** This may extend to color coding rules, wire terminations markers, conduit routing, pull wires included in conduit, in-panel work, and all adherence to terminologies and markings on your drawings (which must obviously be clear and correct).

It is extremely unwise to ignore the quality of the subcontractor's work, as he represents you in the eyes of the customer.

Similar to Materials cost control, cost control for subcontracts takes place BEFORE the subcontract is issued, assuming that the P.M. ensures that the Subcontractor does the work as instructed. KEEPING TRACK of the cost via vouchers in the office accomplishes very little for the final cost outcome.

There is, of course, a need to stay aware of the subcontractor's progress, such that you will not pay him for more work than he has really accomplished. (In that case, you would lose money in the event of his bankruptcy.)

CONTROL OF MISCELLANEOUS COSTS

All miscellaneous costs must pass through the P.M.'s hands in the form of decisions and approvals.

Real "control" in the sense of DIRECTION GIVEN to the events taking place, happens at this time. The thought process that decides to make the expenditure or not, is a SITUATIONAL one. This means that a decision to spend or not spend the money, is made at the time the event occurs.

Later 'tracking' does not change the outcome of history; although of course, history will repeat itself unless we learn from it. (Which is *one* reason for MIS Tracking costs.)

In all cases, the initiative to SPEND must be weighed against the estimate (did we estimate 'it'), against the need (do we really need this), and against other factors :

- what is the cost of NOT doing this
- is there an alternative to incurring this cost
- can we rent rather than buy this seldom-used tool
- is it cheaper over-all to pay for hotel and meals than to lose travel time hours.
- is there a labor cost / material cost trade-off
- will the cost of (e.g.) an on-site trailer be offset by improved labor efficiencies
- etc

This decision process is similar to that of the DESIGN ENGINEER when he selects the job equipment. Various options are quickly weighed, and a sensible decision is arrived at in short order.

What should be understood is that the DECISIONS which are being made by all project personnel, will be BETTER decisions if all the players on the team share the same, clear understanding of what the PLAN and SCOPE for the contract execution are.

Excessive office 'tracking' efforts result in extra labor being spent with no real results in increased control. A month-end MIS report serves the purpose of COST AWARENESS to our satisfaction, provided that the breakdowns in MIS categories are sufficient, and can generally be related to (line up with) the Estimate and Project reports.

Ideally, a single data entry system would 'drive' both the project cost control system as the accounting/ MIS system. Delaying the cost control system because of Accounting reasons is a bad idea.

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LABOR HOURS CONTROL

Labor COST control is directly related to labor HOURS control.

INSTALLATION STANDARDS ARE AN IMPORTANT KEY

As with material and subcontracting, STANDARDS have a great impact on labor cost control. The labor task disciplines used in the operation should include appropriate and well thought out standard approaches such as: installation processes, commissioning, calibration, verification and testing, client and internal communication. There should be appropriate check-off forms that can be used to document the process with the client or consultant, which also helps from legal (obligations fulfilled) and financial (collections) aspects.

An ACCEPTANCE PROCEDURE should be employed for a labor tasks so that expectations are as clear internally (your people know what is required) as externally (the customer knows what he's getting). This helps people distance themselves from vague processes and hollow wheel-spinning, and towards clear expectations and purposeful, goal-oriented activity.

Working towards acceptance should start EARLY in the project, one could say DAY 1, so that the project is self documenting for technical, legal, financial and training purposes.

With some provisions made for labor pay rates applicable, overtime labor used, and the use of apprentice labor etc., the relationship between hours and dollars is direct, and LABOR **COST** is indirectly taken care of if LABOR **TIME** is controlled. The message should be that TIME is of the essence, that you are meeting a DEADLINE measured in TIME, not dollars.

This difference may appear trivial, but it must be remembered that the people who in the final analysis determine the time spent on certain tasks, are the non-management people doing the actual work.

Invariably, there is not a strong level of acceptance by these people of COST accountability, whereas TIME is much more readily accepted as being under their control.

Additionally, attention paid to DOLLARS reduces the focus on the labor HOURS measurement and control efforts.

DOLLARS may be interpreted as *being "not MY problem; MY job is to solve real, technical job problems, and to do a fair day's work"*. Why fight human nature? You'll lose every time!

DIFFERENCE BETWEEN TRACKING AND CONTROLLING LABOR

NOTE that there is a difference between TRACKING labor and CONTROLLING labor.

TRACKING labor involves collecting data, via time sheets etc., on the amount of time already spent on a job. TRACKING may show us how successful control IS or HAS BEEN. TRACKING deals with HISTORY.

CONTROLLING labor involves the SETTING of labor goals per measurable area and tasks with the people involved, COMMUNICATING these goals to these people, MEASURING progress against goals and time constraints, and COMMUNICATING the results to the team.

The TEAM concept is crucial to the success in our business, due to the 'one-of' nature of our installations (they're all different), and the low degree of 'supervision' normally possible due to the number and location of jobs.

LABOR COST CONTROL

It is a key factor that a project be managed to reflect the design, and that the design follow the estimate's assumptions. Departure from either should be forbidden unless there are serious and extenuating circumstances. (Clearly, that implies that the estimate should be assembled to realistically reflect a proper performance process in the first place - admittedly this could be a "chicken or egg" situation)

Subsequently, performance and progress should be reported so as to follow the designs and plans, which validates the project plan (if everything goes OK) or raises flags early (in case of problems).

SUCCESSFUL JOB COST CONTROL COMES FROM THESE FEW BASIC ELEMENTS:

- A FIRST-RATE ESTIMATE (detailed, reasonable, realistic assumptions, credible, using standards)
- A FIRST-RATE DESIGN JOB (accurate, timely, complete, verified, using standards)
- HAVING THE QUALIFIED PEOPLE TO EXECUTE THE WORK. (manpower, using standards)
- DOING THE RIGHT WORK (not too early nor too late; within our scope and estimate of work)
- DOING THE WORK RIGHT (verify while installing; complete job ownership by all personnel)

One key to cost control is in our OVERALL ability to break the job into the 'right' pieces or geographic building areas. This starts from the SALES estimate, through to the DESIGN group, and into the planning and INSTALLATION.

The suitably-sized segments are then more easily grasped by the P.M.'s and tradespeople in setting production expectations and standards, and measure the actual production against expectations in fairly small intervals of time and tasks performed.

This way, responsibility and accountability for performance remain as close to the trades level as possible, which is a necessity for successful labor control. People must be IN CHARGE - and accountable!

The P.M. must ensure that the job segments (areas A ... W or systems 001 ... 999 in Concerto) lend themselves easily and naturally to be recognized as:

- easy to differentiate (know what we're working on)
- subject to clearly-understood field labor conditions.
- possible to start and finish independent from other areas.
- not too small nor too large. Size should be significant enough to warrant the planning effort, but not too large so as to cause the loss of 'feel' for the contract.

Feedback from the field will be in the form of weekly timesheets, showing the area and the tasks worked on during a certain period. The key to success here is to keep the work areas extremely clear, and the tasks very defined.

Hopefully, the variety of tasks any tradesperson performs should be limited to 3 or less, and ideally as little as only 1 per day.

The design, programming, drafting and P.M. work is not always area-oriented, and can be reported and measured as 'global tasks' only.

TRAILING COSTS and WARRANTY

Trailing costs are costs that 'trickle in' after a project has been closed and financial reporting has been done on the "completed" projects. If costs trickle in that really belong to the project's installation, these should NOT be treated as Warranty costs. In actuality these types of costs should NOT happen (they DO) and the reason for their existence should be procedurally eradicated. An example is late invoices for material or time sheets, subcontract invoices, cost transfers from other projects, etc.

If these costs are allowed to bypass the normal measuring system, then a project's profit is artificially overstated (with possibly incentive or other cost repercussions).

Trailing costs should be tracked and reported by projects, and the responsible processes should be corrected.

Warranty costs are costs incurred after the project is completed and accepted. These costs are legitimate costs that are incurred when defects, breakdowns, etc are corrected. These costs should be **anticipated**. When a warranty cost is estimated, (whether or not the warranty cost is marked up for profit), this cost is NOT really a part of the project's cost, and is should not be declared as PROFIT at the close of the project. In reality, a separate project could be set up that represents the "Warranty Job" so that it can be separately tracked as a project, with its own estimated and actual costs. At the end of the warranty period, it can be closed out with an associated profit or loss, which lends credence to the amount of warranty estimated, and/or to the success of the warranty performance process.

If warranty performance is sloppy, significant margin dollars can be lost without clear knowledge of where the money is going. Often poor project performance is hidden by dumping trailing costs and actual project work into a global "Warranty account". This is not a good business practice, and may even have an effect on performance bonuses or commissions paid.

We recommend that management have a regular 'look' at warranty costs to make sure they really ARE warranty issues and not a way to incur late project costs after the job was supposedly 'complete'.

TIME SHEETS

Time sheets are the basic communications vehicle to let 'the system' know for any contract:

- HOW MUCH time has been spent (hours)
- IN WHAT AREA or SYSTEM this time was spent (A ... W or 1...999)
- WHAT was done during this time (task code)

Time sheets form a crucial element in the weekly project tracking process, and also in the short-term CONTROL process. All 'project labor hours history' comes from the Timesheet.

Progress against the plan is, to a large degree, also measured from timesheet data: work tasks performed (as per the P.M.'s evaluation) is compared against time spent (from timesheets), to check if a project is 'on plan'.

The planned hours LESS the hours already spent (as per timesheet data), determine the 'backlog hours', or hours expected to be spent in completing the plan.

The monitoring of performance is further fine-tuned on a regular basis by the P.M.'s personal evaluation of the observed time it takes to execute a task, versus the time anticipated or planned for that task. This will result in the P.M.'s "educated projection" of the time for the work tasks LEFT TO DO, to be compared against THE TIME LEFT ON THE JOB LEDGER (Backlog hours), and resulting in the Estimated Final Cost calculation.

LABOR UTILIZATION

Anyone can get a job done within the budget if they don't charge their time to the budget. When an employee charges time to accounts other than projects, that time is not absorbed in projects, and we say that our labor utilization is affected.

When management prepares an annual budget of revenues and costs, certain assumptions are (should be) made regarding labor utilization. If it was **anticipated** that a technician would charge 80% of his time to projects, (40 hrs/week x 80% = 32 hrs), that leaves 20% to be absorbed elsewhere, in overheads. If in **reality** he charges only 60% (40 hrs x 60% = 24 hrs) to projects, there are 8 hours per week, or 400 hours per year, that become a burden or overhead. The projects may look better, but the overhead is killing the company, and profitability is erroneously reported.

To defray the personnel costs onto projects, the hourly rate estimated and charged to a project could include an allowance that covers absorption. Alternately, an 'overhead charge' to each project can defray these costs. In either case, it is important to recognize that if the ACTUAL absorption differs from the PLANNED absorption, the difference will show up at the bottom line as a gain or loss. NEITHER one is desirable, because any erroneous absorption can either mean we're losing money, or losing work.

If the absorption is made part of an hourly rate, and if an employee costs \$50 per hour as calculated at 40 hrs per week, an absorption rate of 80% would drive an hourly charge rate of:

$$\frac{\$50 \times 40 \text{ hrs}}{40 \text{ hrs} \times 80\%} = \$62.50 / \text{hr}$$

Generally, the principle is that PROJECTS are the only revenue producer, and pay for running the whole operation. Hence the goal of absorbing costs into projects is to defray all costs either through direct or indirect project charges. There is no "pot of gold" from which to draw.

B. ATTRIBUTES OF A SUCCESSFUL PROJECT CONTROL SYSTEM

One must have sufficient information on hand to make intelligent decisions. Better and more information normally means that better decisions can be made. However perfect information is rare, and in fact, it can be said that **decisions are only necessary when the available information is incomplete. In the face of perfect information, the solution is obvious to anyone.**

In the case of our Project Control discussion, this becomes:

- believable data
- requiring easiest 'input' possible
- with output in a simple, useful format
- offering enough detail without information overkill
- not requiring too much current analysis
- with historical significance to allow later detailed analysis
- comes in a regular, dependable time interval
- requiring minimum involvement in 'quiet' activity periods
- its primary goal is to control the project costs; NOT to inform senior management, although that can be a side-benefit.

The additional requirement is that a strong continuity must exist in all of the project's reporting systems, such that the WHOLE organization thinks and feels the same way. This implies a strong connection between:

- estimates and estimating reports
- engineering details and project re-estimates
- ongoing job planning and tracking reports
- MIS job cost detail reports

Considering that the MIS reports are something which by their nature are a MUST, it would appear that it would be a good idea to ensure that the MIS system reports satisfactorily in cost content, accuracy, presentation and timeliness.

If this approach reduces or removes the need for parallel manual systems then many people save a lot of time, and talent is freed up to perform jobsite tasks. (ERP Systems!!)

Furthermore, the integration of the ESTIMATING, DESIGN, MIS and PROJECT CONTROL information and reports is essential for the 'elegant', smooth and competitively successful operation.

All of the ICS system designs have this "comprehensive viewpoint" in mind.

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SKELETON of the ICS CONTROL SYSTEM

In its most basic form, we perceive the 'contract flow' to be as follows:

- sales are responsible for the determination of the terms and conditions of the sale or estimate.
- the estimator prepares the estimate. (sales/ops) (Operations may be involved in, or actually do, the estimate; this leaves sales to concentrate on conceptual sales, free from the estimating tasks.)
- the estimate is put together with the INSTALLATION process in mind. This means that the take-off and estimate is broken up into a number of 'geographic areas' or locations, each of which will include the associated equipment, installation material, and accessory costs which are subject to the same installation difficulty factors, both from an ESTIMATING and PLANNING INSTALLATION viewpoint.
- after the job is booked, a turnover 'communications' meeting is set up with sales, the P.M. and the designer present.
- the basic job estimate re-cap is entered in the MIS system for detailed tracking, job control and historical value. (cost milestone)
- **The P.M. determines the final breakdown of the 'job' into the control areas. These areas are assigned a letter designator (A,B V,W) and a name (e.g. Penthouse, 3rd floor Mech. room..). These areas will form the basis for the engineering design. (This step is basically a confirmation of the Estimate Breakdown).**
- operations designs the job in detail, and re-estimates the job (as-designed) in the process. A job re-estimate includes equipment, installation material and labor costs based on the designed equipment and re-scaled conduit and tubing runs. The job re-estimate should be based on, and will hopefully closely resemble, the sales estimate. This re-estimate will be a first Estimated Final Cost adjustment on the project.
- the job re-estimate data is entered into the MIS system as a 'milestone' guidepost. This means that financial projections are now made based on this 'new estimate'. This is necessary because if there is a difference between the "Sales estimate" and the "actual expected cost", you need to correct revenue expectations so that revenue and profit declarations reflect reality. If you do not, you may end up with a situation where all "expected" costs are incurred in accordance with the SALES estimate, but in reality more work needs to be performed after there is no revenue left. This messes up all profit and revenue projections, which deprives management (and tax auditors) of a necessary decision tool.
- the job re-estimate (like the estimate) also provides labor detail breakdown information; this is used by the P.M. to put together a JOB PLAN which is based on the re-estimated job details, including all devices, tubing and wiring runs, etc.
- the job plan raw numbers (hours, feet of tube/conduit..) are produced directly by the operations re-estimate, and are already adjusted for such standard factors as ceiling height, difficulty factors, building types, etc ...
- the MIS reports will provide sufficient detail to evaluate
 - * sales estimate numbers to-date ("as-booked")
 - * operations plan estimate to-date ("as designed")
 - * latest Estimated Final Cost estimate from the P.M. ("latest projection")
 - * actual (recorded) cost to-date ("actual to-date")
 - * expected cost (Estimated Final Cost **minus** actual to-date) calculation.
 - * current month's costs incurred (Material, labor, sub, misc.)

- Also, labor DAYS (calculation based on dollars cost, \$/hr rate, and hrs/day worked) are shown for current month activity, operations estimate, Estimated Final Cost, actual labor days used to-date, and days-to-come. (= yet to be worked)
- the labor breakdown information is communicated CLEARLY to the installation crew. The information must be presented in a simple manner, so that the installers' time sheet can be accurately completed (and phoned in?) with the 'area' and 'task' information on any jobs which are being so tracked (large or specifically designated jobs). [See 'PLUS' planning section]
- the P.M. regularly reviews by building area (A..W), the labor already spent, the total labor planned, and the labor required for the tasks still to be performed. He may consult others to determine this information, but it is the P.M. who will be accountable for keeping the projections current.

THIS IS A VERY IMPORTANT P.M. TASK

- Any projections which indicate that the expected final job cost (material, labor, subcontracts, and expenses) will be significantly higher or lower than the current Estimated Final Cost (Estimated Final Cost), must result in a new Estimated Final Cost adjustment being recommended to Management. Again, this keeps the revenue and profit picture accurate.
- Action steps must be taken to ensure that any cost overruns are minimized. This requires that very **REGULAR** cost projections and cost tracking are necessary for VERY **ACTIVE** projects. Review frequency will vary with job 'activity': perhaps MONTHLY at the start, but WEEKLY when significant portions of the job labor are expended.

It is important to remember that the last few weeks' labor on our installations will often make or break the job's success.

Additional notes:

- While it is necessary to adjust cost expectations as new 'facts' are learned, excessive and frequent cost adjustments may be an indicator that the P.M. does not have a good grasp of the project's situation.
- A re-estimate and recognition that the sales estimate was, in retrospect, not "accurate", does not change the fact that the customer's P.O. did not change. You still have only X dollars to complete the work. It is still your goal, albeit a more difficult one, to bring the project in at or below budget while satisfying your contractual obligations. An early re-estimate that points out problems, can help you focus on solutions while you still have time. Therefore time is of the essence in doing the engineered re-estimate – certainly before material is ordered and subcontracts committed to.

C. JOB PLANNING PHILOSOPHY

Industry specific comments related to "Control" and "Supervision"

In analyzing needs and efforts to control the costs on projects, the following observations are made.

We are in an industry where the people tend to be involved in the simultaneous performance of a number of contracts. This has implications regarding the degree of Supervision and help that can be given to people on an on-going basis. It is NOT practical to guide your people minute - by - minute.

Hence, self-discipline, a genuine desire to perform in a team setting, and the ability to work with minimum supervision are crucial for the success of your people.

Many control installations consist of fragmented bits of work, not easily 'programmed' via a super-sophisticated 'project management' system, due to the large quantity of tasks to be measured. This tends to make the traditional 'project management' mathematics cumbersome, and of diminishing-return value when applied to the (typically large number of) small, fragmented, non-contiguous work segments.

Like many industries, ours has a number of tasks and work situations that are of a 'not-new' nature, that have been 'seen before'. However, our work is FAR FROM an assembly-line type production. Every job is a one-of-a-kind, (*"Every one is a prototype"*), and lessons learned by us on one contract can typically only be transported to a new job via a 'knowledge' (*"I've seen this problem before"*) vehicle as opposed to a 'standardization of tasks' (assembly line methods) vehicle. As an 'old' problem resurfaces, it is likely to look entirely different. Again, the message here is that excessive reliance on a 'system' may be dangerous, as "mechanical duplication" of the past is seldom applicable. Of course, 'standards' can be extremely helpful in creating "I've seen this before" scenarios.

RESOURCE MANAGEMENT versus PROJECT MANAGEMENT: The manpower levels of our offices are not easily or quickly changeable on the design/ tech/ programming side, and to a large degree the installation labor side. Significant training time is required to get people 'up to speed'. This results in the need to reschedule existing resources, rather than to acquire more resources to meet short-term needs.

- Hence, SCHEDULING manpower ('WHEN') has a high priority; this is related to RESOURCE MANAGEMENT.
- When you orchestrate activities on a particular project ('HOW MUCH, HOW'), you are then dealing with PROJECT MANAGEMENT.

Competitive pressures add to the above, in that it is not economically viable to build a structure that depends for success on the ongoing physical presence of supervisors or management in any sense other than that management must be available to remove the 'roadblocks' and provide answers.

The operations people that are attracted by this business tend to have strong technical capabilities, and they tend to focus on, and sometimes limit themselves to, technical solutions to all problems, be they technical or not.

The expectations placed on the industry by its customers are high, as a result of the 'black magic' image that is created by the perceived 'ability to make things work'. There are enough people 'dreaming' up new opportunities and products in our industry to keep full employment probable.

This brings with it, however, a state of continuing change and evolution. The industry is very complex, as evidenced by the enormous number of 'solutions' that exist for an enormous number of 'problems'. The people that are retained by this industry tend to be the more technically inventive ones, with strong creative urges and a desire for 'elegant solutions'.

Personal, internal commitments can overshadow the external expectations placed on our people, and our project control systems must take into account these 'soft' factors of our business.

Many of our projects are 'too small' or too drawn out over prolonged periods of time to allow us to staff the jobsite on a full-time basis. This means that people have more than one jobsite on their mind, and performing-level employees carry a large amount of jobsite-information around 'in their head'.

In the absence of any over-all scheme (PLAN) whereby a very clear understanding exists of 'what has been completed', any change in personnel is potentially DISASTROUS. To illustrate this, just count the large number of different people who have been 'involved' with a project that really 'went bad' - and if you have never analyzed this scenario, *be prepared to be shocked!*

GENERAL PLANNING CONCEPTS - REASONS FOR PLANNING

WHY PLAN ?

The next several pages will deal with the WHY of planning. This is done in the conviction that HOW is less intimidating if people understand WHY planning is beneficial.

A PLAN IS A TOOL

First and foremost, let's do away with something many people are mistaken about :

*Creating the plan is NOT a legitimate end.
The 'plan' is only a tool in the planner's toolbox.*

There are no bonus marks for 'creating the plan', unless it's USED

Is 'NOT PLANNING' an OPTION ?

Planning jobs in our industry has not enjoyed the attention of the majority of people, including some of the successful ones. In fact, it **is** possible to complete a project reasonably on time, within estimate, without the obvious benefit of a formal project plan.

More often than not, the projects that fall in this category, are found to be directed and managed by people who have had years of exposure to very similar situations. Also, the projects tend to be a repeat of previous experience, and smaller rather than larger; the result of which may be that the planning efforts, although being informally made, are often invisible.

When projects are larger, or less familiar in concept, or staffed by less experienced personnel, or impacted by a larger number of 'other' contractors, the chances of the project being completed within estimate and on time get much smaller if left to 'chance'.

NOT PLANNING, in the sense that you'd be 'spectators' rather than 'players' in the game, is NOT a successful, recommended or accepted method of running your business.

WHY IS PLANNING SUCH A HARD THING TO GET INTO ?

While there are probably a number of factors at play, we offer the following as a major one :

We don't like CHANGE.

But...

**"The world hates change.
Yet change is the ONLY thing that has brought progress."**

These words have achieved cliché-status only because they are true.

WHAT ARE THE GREAT BENEFITS OF PLANNING ?

In our 'distributed' world where people often work without direct supervision for prolonged periods of time, there is a real need for effective delegation. That relates to management's acceptance of the performing personnel's authority to make certain decisions, and their willingness and ability of those people to take charge of the decisions to be made, and be held accountable for them.

In the absence of a project plan, the many people involved in the completion of the contract have no guidelines within which to make decisions.

“Decisions are not required when the answers are self-evident.”

A good plan provides a clear framework within which the planner himself, or others on the job, can make better decisions. If it is understood that many small daily decisions can actually decide the final outcome of the overall project, it should be clear that a well defined plan serves as a kind of 'road map' to success, only more so: in our world, the road changes position!

The 'Plan' completes the process of formal communication to all project personnel, by ADDING another dimension of information to the contract documentation. A proper ENGINEERING DESIGN is an important part of the 'decision making' guidelines on a job. Imagine for a moment what would happen if you prepared NO contract documents at all, and only sent plans and specs to your installation forces! Planning ensures that the good work accomplished by the estimating and design teams, gets communicated to the performing personnel so that true delegation of the tasks is accomplished.

It will also be appreciated that on a project, a great number of decisions, large and small, are made between start and finish. These decisions are unavoidable, and all of them are best made as soon as the necessary information is available. Typically, waiting too long to take action or provide information (e.g. on installation details or wiring connections, etc.), results in cost increases and time delays which increase EXPONENTIALLY with passing time.

Further, any decisions made by the 'wrong' people will invariable result in disaster as well; for instance, design decisions must not be made by installers; installation decisions must not be made by programmers. Decisions are best made sooner, and by people who have the time and ability to gather the proper information.

-

PLANNING PRINCIPLES .

Planning can be a pretty boring, thankless, useless task if the wrong approach is taken. To be otherwise, we must get it straight in our mind that planning is NOT an 'event':

PLANNING IS AN ATTITUDE, A FRAME OF MIND, A PROCESS.

A prime attribute of a good planner is the ability to foresee an end result acceptable to the parties involved.

The following pages discuss some basic principles that should be employed when planning our jobs.

Planning is backwards !

There lurks a real strange wisdom in the following statement:

In planning, you start from the end, and work your way toward the beginning.

With that we mean that to put a successful plan together, we must KNOW WHERE WE'RE GOING.

And remember, the ESTIMATE establishes **WHERE** we're going; the PLAN shows us **HOW** to get there.

For our job plans, that means that our plan will consist of a series of steps and actions which will get us to the 'end': to complete the installation on time, and within the estimate or budget.

The 'Plan' is our prediction of the best sequence of events and road map to detailed action steps. To determine these steps, go BACKWARDS from where you want to end up. Just as we draw a line between two points, we establish the PLAN between the START POINT and the END POINT (Estimate).

For instance, after we estimate 1000 hours of electrician time to complete a whole job, we produce a plan in segments that will add up to 1000 hours, while at the same time balancing the breakdown of hours per segment so as to reflect reasonableness. We should NOT review individual steps, assign hours, and add them up to see what our total 'plan' is. You can do that to *assemble* an estimate, NOT to perform *against* an estimate.

Another 'smart' reverse-thinking trick: realizing that about 15% of the time spent in completing work in an area is used near the end to go back and 'clean up' or fine-tune, we can consciously set aside this 15%, and plan to have the job 'installed' in 85% of the time. This act should / could be shared with the performing personnel, in recognition of their commitment to on-plan (100%) final completion.

I don't have time to plan; I have work to do!

Planning IS work; it is a productive process. It may in fact be the MOST productive of all tasks on a project since it can PREVENT us from going in the wrong direction, and having to un-do, then re-do tasks or installations, etc.

The single most important function of a project manager is the planning function.

The plan is done. Now on to the next thing ...

Planning is an ITERATIVE process. That means that the 'Plan' keeps changing as we get deeper into the planning process, and get feedback and input from more people. We learn more about the FACTS, and we have more feedback about previously made decisions.

This should NOT mean that 'the plan' requires continuous maintenance or time-consuming 'fiddling'. Rather, it requires a keen and continuing awareness of the status of ACTUAL conditions versus PLANNED conditions, and the ability to take ACTION on the information if and when required.

Take it apart - Then re-assemble

When plans are ineffective, it is often because of these reasons:

1. the steps are too large. Unplanned, hence uncontrollable, substeps occur and mess up the execution.
2. the steps are badly defined, and arranged in the wrong sequence.

The smaller the planning steps, the more effective the plan! (within reason of course)

A benefit of ENORMOUS proportions is the fact that the person who takes a contract apart in its smaller elements, will much better understand the significance of each step, and the way the steps interconnect.

Putting the elements together again is a process that further underscores the above statement's significance.

In planning, knowledge is the key. Knowledge comes (in part) from mentally disassembling, and then re-assembling the installation before any physical work is done.

Plan with events - NOT with activities

This is a good way to ensure that the progress toward the goal is measurable. Lack of measurability translates into lack of a plan.

Days, and minds, are too often filled with ACTIVITIES instead of EVENTS. For instance, people tend to think of the activity of cutting the grass on the weekend, rather than thinking of the event of completing the cutting of the grass.

MILESTONES are the guarantee that we'll know if a plan segment has been completed as planned: it's either done, or it isn't. (The grass has been cut, or it hasn't been cut.)

As an example to illustrate, an example of an EVENT or MILESTONE is: "The submittal drawings have been received approved".

An example of an ACTIVITY would be: "We are preparing the drawings for submittal to the consultant".

Effective planning will re-focus us from EFFORTS to RESULTS.

Planning ensures execution

We must improve our execution;

We need to execute better."

Sound familiar ? These phrases really point out that a certain performance could have been better, in the eyes of the commentator. But, don't blame the performers unless:

- 1) the performance is predetermined and measurable.
- 2) the achieved performance is measured against the expected, communicated, and reasonable standard.

If the 'message' to the performing trades was : "The job must be done by December 15.", then the task must be measured in terms of whether or not the deadline was met. If the deadline WAS met, and we blame the workers because "too much money was spent", we are guilty of setting the wrong standards.

The proper planning process includes complete and clear communication. When this is accomplished, good people can do good work because they know what's required from them. Their daily decisions will reflect the plan.

WITHOUT A PLAN, you can only HOPE for successful completion.

WITH A PLAN, the probability of success increases significantly. Chances for meeting or exceeding the expectations (estimate) are greatly enhanced by planning in advance, in detail.

Plans are Self-Fulfilling Prophecies

Planning makes the old adage come true:

'You get out of it what you put into it.'

- Sloppy (or NO) planning will lead to haphazard results.
- A good plan will give good results.
- A good plan on a job that was badly estimated, will greatly improve the job's chances for (relative?) success.

A person operating 'under the influence' of a well-organized plan, will exude and radiate confidence; the 'air' of someone who knows exactly what he or she wants. History will tend to unfold itself according to the plan, instead of according to the fickle laws of probability.

In nutrition : **You are what you eat".**
In business : **You become what you plan."**

Relevant approximations are better than meaningless Super-detail

A plan deals with the future. In reality, nobody can predict the future accurately. Hence, technically speaking, every plan is doomed to be "wrong" or inaccurate in the absolute sense.

This illustrates the fact that the focus of 'planning' is NOT on trying to accurately predict 'to 2 decimal places' what the job's outcome will be. Planning is done to allow us to provide a means to guide our decisions, and to increase the PROBABILITY of successful job outcome.

Stubborn adherence to 'decimal places' must be avoided; planning can be reasonably approached in 'round numbers'.

For instance, if FLOOR 1 in a building 'calculates' to 73.8 hours of electrician time, 'round' the number to 75 hours (or 10 days.) In another area, you'll probably round 'down', and the total sum of all the 'plan' hours will be very close to the 'estimate'.

The concept of '10 days' is an easy one for people to grasp and act upon.

Don't set Unmeasurable objectives

That we want to measure results against a predetermined plan is fundamental to the planning process. If the plan itself, or the way you go about executing the plan, makes this evaluation impossible, then the planning process suffers, and so will the job results.

This is often a tricky task. Measurement becomes difficult when you allow our activities to be divided into little spurts of action in a confused manner, and when work is done in many areas at the same time.

Again, the smaller the plan steps, the more accurate the measurement can be, and the easier it is to 're-shuffle' the sequence in which the steps are performed without losing the ability to measure progress and completion versus plan.

And to repeat: measure results, not activities. A project element is either done, or it isn't. If most of your plan elements are 80% complete, have been left for a while, and won't be done for weeks or months, you have the wrong planning breakouts, and your plan is not a good plan.

Conclusions

We have discussed the various aspects of planning; and why planning is a necessary and productive activity.

Hopefully, it has become clear that job planning is not optional for your people who are in charge of projects. However, the whole team (sales and operations) must support the planning process to ensure its success.

The remaining discussion will deal with the MECHANICS of the planning process.

D. JOB PLANNING IN THE CONTROLS INDUSTRY

The description of the Planning Steps can be kept CONCISE. It is accepted that every job requires a certain degree of individual review and evaluation due to the 'one-of' nature of the business.

PLANNING – ASPECTS AND BENEFITS

Unless he plans a project in advance, a Project Manager has not really earned his job title. A project manager must **influence** to make an impact. Otherwise he's just 'letting it happen'. The influence may be subtle and gentle, or at times brutal or painful, as demanded by the circumstances.

Without planning, he will be fighting a thousand brush fires. And while planning takes time up front, good advance planning extinguishes most of these fires, and provides more productive time to the manager and all other personnel.

A major reason that planning does not take place, is that people are putting out fires on the last job(s) they did not manage properly. The trick is to get out of the vicious circle. If they weren't putting out those fires, they would have more time to plan and prevent other fires. You get the idea: catch-22.

Consider that good **PRE-Execution Planning** (PREP) is a virtual guarantee for increased profitability.

What constitutes good PREP? Figure out the 5 W's – who, what, when, where, why. And finally, HOW.

The problem with PREP at some companies is that it's delegated without support. Managers are told to, and expected to, plan a project. However there is no management support: time is not set aside, and the culture is not ingrained. For PREP to be successful, it must be supported from the top down, and to be made part of the company culture and belief system. If management does not believe that planning time is productive, subtle signals will alert the P.M. that he's considered to be goofing off when he's planning.

An example sometimes given to illustrate the potential for operational improvement is the dramatic change that has taken place in job site safety. Since foremen have been given the power to fire workers for unsafe work practices, job site safety has skyrocketed. Whereas serious and fatal "accidents" used to be considered the price to be paid for construction work, today the expectation is zero-tolerance on safety.

A similar approach to planning is required to drive the attitude shift.

Good PREP may cost more on the first few jobs, but overall, there are few things that a project manager can do that will produce a better return on investment. Without PREP, (so the story goes), expect two portions to the job: the **first 90%** when great progress is supposedly made, and the **NEXT 90%** of the job, when all the loose ends are tied up and corrections made.

The wife to her husband after checking the road map: "Honey, we're driving in the wrong direction!". He replies: "Yeah, but we're making good speed".

Should small and medium jobs also be planned?

Some companies have adopted a formal planning process on the monster jobs, but the smaller ones are essentially left to chance. Poor choice, because that's where a major opportunity for higher profit lies.

With good PREP, additional benefits are:

- More opportunities for pre-fabrication
- More opportunities for doing work in unoccupied areas, under better work conditions.
- Smaller crews, less overtime
- Fewer instances where you fall behind the schedule
- Personnel in a better mood
- Better site planning
- Better materials handling
- Less time wasted waiting for materials
- Less material restocking charges
- Better cash flow
- More effective guidance from project managers – they're not busy fire-fighting
- Problems can be uncovered and dealt with sooner
- Fewer late project concerns and charges
- Better project documentation
- More professional in the eyes of the customer and other contractors.

**“Planning is optional
only if Profits are optional”**

MAJOR PLANNING STEPS

The major steps required to create and execute a workable plan, are as follows:

1. **THE MOST CRITICAL FIRST STEP:** right after contract award, bring the project manager, foremen (if applicable), designer, and sales person together for a detailed de-briefing while the details are still fresh in the sales person's mind. The purpose is to get 100% focused on the project, and uncover any major obstacles before the energy is spent in the wrong direction. The ESTIMATOR should set the tone at this meeting. This gets the project started at a 'hit the ground running' level, with everybody on the same wavelength.
2. Establish general workflow, and payment terms and/or payment schedule to support cash flow needs. Produce a schedule of values (SOV) to get billing claims pre-approved as early as possible. (ICS Concerto Suite produces a detailed SOV).
3. Establish the material / equipment needed for the Contract. This takes into account the plans, specs, P.O., and your experience. Schedule orders and deliveries to minimize cash flow drains.
4. Establish Subcontract scope/cost. (if any). Get more than one quote. Prepare clear subcontract bid documentation.
5. Define AREAS within the building which can be used as the basis for Labor planning / tracking references. These areas will be such that installation personnel can very easily recognize where one area ends and the next starts.
6. Calculate / estimate the portion of the estimated installation labor that is represented in each building area. Also, calculate each non-installation labor category's hours and tasks.
7. Allocate labor planning contingencies (allowances for end-of-job cleanups)
8. Communicate the tasks, areas and associated labor to the performing employees.
9. Report and track the labor, and compare regularly against the planned labor.
10. Analyze and take corrective action when labor is projected to exceed plan.
11. Regularly communicate progress to performing personnel; get feedback from them.
12. Keep accurate records.

These steps are explored in more detail in the following, as they apply to the ICS estimating / design / planning tools. Note that the individual steps are NOT necessarily separated in the ICS methods, since the 'tools' sometimes provide more than one step at a time.

-

E. JOB PLANNING

PLEASE ENSURE THAT SECTIONS A,B,C, and D HAVE BEEN CAREFULLY READ BEFORE PROCEEDING WITH THE SECTION ON JOB PLANNING

TOOLS AVAILABLE

The 'tools' made available for planning are designed to accommodate the required planning steps with a minimum of effort, and a maximum of useful output. Effective use is made of labor saving computer software packages.

The following 'tools' are expected to be available to allow the Sales and Operations People to produce and use the plan:

- **the SOCC estimating software package (Part of Concerto)**
- **the System design software package (Part of Concerto)**
- **the PLUS job Planning Software package (Export from Concerto)**
- **the MIS Management Information System (accounting - external)**

The procedures which make up the 'Mechanics' portion of ICS's Job Planning system, are designed with an eye on:

- being flexible so as to be useful for small as well as large jobs.
- providing a large result for a small effort.
- providing the necessary guidelines to allow people to stay 'on top' of job progress, as compared to the predicted plan.

PLANNING STEP 1. SOCC ESTIMATING

SOCC is the estimating engine within the Concerto package. One of the features of SOCC is its ability to allow the estimator to define up to 20 building areas (each with detailed systems). These ESTIMATING areas become the DESIGN and INSTALLATION PLAN areas (A..W) that the designers will use to arrange the control systems, and that the P.M. will use to schedule the field labor.

The SOCC system establishes CLEARLY the quantities of devices and their costs. It also establishes the Labor associated with the devices, and with installation materials such as wire, conduit, and pneumatic tubing. SOCC also determines the labor associated with the design and programming of systems and software packages.

The cost associated with subcontracts, as well as expenses and allowances, can be entered or calculated.

Hence, the cost impact of TANGIBLE as well as INTANGIBLE items can be nailed down with SOCC.

All of the field labor details are available by AREA breakdown, in the following categories:

COMMISSIONING (Tech)
ELECTRICAL INSTALLER
PNEUMATIC INSTALLER

The labor which does NOT depend on building areas, is available by overall TASK breakdown, in the following categories:

DESIGN
DRAFTING
PROGRAMMING
P.M. LABOR
SHOP LABOR

Detail reports are available from SOCC for Material, Labor, and other job costs.

PLANNING STEP 2. DESIGN

Guided by the Contract Documents, including the Estimate, the designer uses standards, and his skills and experience to prepare the System Sketches and Schematics. The equipment requirement is determined from the plans and specs, and compared with the SOCC estimate.

TWO basic approaches are possible with the transformation of the SOCC estimate into a design format:

a. If the SOCC estimate breakdowns are considered 'Reasonable', and the BUILDING AREA and SYSTEMS steps taken by the estimator in SOCC are acceptable to the P.M., the 'transformation' of the SOCC ESTIMATE into a DESIGN package is very easy and time-efficient. The SOCC estimate is 'transferred' in the design area of the program system via a single keystroke, and the basic 'design' as based on the job estimate, is DONE.

The ESTIMATING AREAS can be accepted as PLAN AREAS, (or minor changes made), and the estimated SYSTEMS are 'cleaned up' to ensure complete equipment lists and costs. For instance, quantities can be adjusted, and full equipment part numbers and drawing tags completed to match the job requirements as **actually designed**.

b. If the P.M. should decide to completely change the Building AREA breakdown approach, and the job AREA / SYSTEM design fails to resemble the SOCC estimate in any way, then the devices could again be 'manipulated' in the SOCC-originated estimate. In exceptional cases they could be re-entered from scratch, but that should be avoided and is seldom needed.

Concerto will produce a material deviation report, which clearly shows any material cost variance between SOCC estimate and design.

The drawings are then completed using CAD / Visio (etc) standards, and the job equipment lists prepared for P.M. approval directly from SOCC.

When approved, P.O. lists can be printed from Concerto to place the devices and installation material on order. If only DESIGNED material is ordered via this method, then material costs are clearly under control of the designers and the P.M. - - NO SURPRISES!

PLANNING STEP 3. **PLUS** Project Planning

SOCC has provided the estimate of material, labor, subcontract, material and other costs.

PLUS is the PLanning Users System, a concept that allows the designers and the P.M. to establish the impact of Labor Costs, and other contract costs in addition to material, as expected to be incurred after the Concerto job design. Essentially, PLUS consists of a detailed and organized MS Project export. It is part of ICS Concerto Suite.

PLUS produces the job Labor detail by Area/System, which is required to obtain a meaningful standard against which to measure Area/System installation progress DURING the installation.

The data obtained from PLUS represents the HOURS OF LABOR required to install and commission the DESIGNED systems in the planned job AREAS. This data is available **broken down** by the field labor CATEGORIES. This makes communication of the tasks and associated performance time expectancy possible without lengthy or time-consuming efforts.

The PLUS procedure, starting from the completed Concerto DESIGN, consists of:

- Review the GLOBAL and AREA labor adjustment factors made in the SOCC estimate from which the job design originated.
- Allow for any labor-related factors which are NEWLY discovered; adjust UP or DOWN; the total labor hours should ideally not exceed the ESTIMATED hours. Use 'Planning' adjustments (contingencies) to preserve a buffer for final task completion.
- Obtain PLUS printouts for the field labor expectations, broken down by AREA; discuss and analyze if necessary; communicate the details and expectations to the performing personnel.
- The PLUS planning tool can be used ONLY after the job is designed using Concerto, because the job installation plan must be based on the 'as-designed' contract documents.
- The PLUS job planning exercise should only be necessary ONCE for each project, but significant changes to the design may require the P.M. to re-visit the planning process, and revise the plan based on the changes in job requirements. This re-visit is as quick and easy as the first PLUS exercise.

PLANNING STEP 4. MIS Management Information System

The MIS system is called upon to be the official company accounting 'keeper' of the job costs committed to a project.

The MIS often tends to be less timely than the in-office control systems, but it provides the important link with the Company's FINANCIAL measurement system.

If the principles of Concerto programs are followed, the MIS system is capable of providing satisfactory feedback on job costs, in an acceptable timeframe, as follows:

- Concerto provides the first, and ONLY cost ESTIMATE. (it defines the *funds available*)
- Concerto provides the target for Material costs. MIS is capable of reporting accurately on material cost, and although it may be slightly out-of-date, this does not matter at all if only the DESIGNED material is ordered at a known cost. In modern systems, the MIS can be up-to-the-minute, which is ideal.
- Concerto provides a clear target for the labor HOURS, and forms a potent weapon in the battle against surprise labor overruns.

Subcontract costs (if any) are determined when the subcontract is LET. Once again, the MIS costs being a week or a month out of 'sync' with actual payments, does not pose a control problem if the payments reflect the known P.O. values which were issued, and the Estimated Final Costs in MIS are up-to-date.

From the above, it follows that the office can be IN FULL CONTROL of its job costs, based on the availability and correct application of the ICS project control programs.

F. FINAL CONCLUSIONS

The Plan Users Guide should be used by Project Managers and other company employees as a guideline for the successful planning, tracking, and completion of Installed contracts.

The Concerto support programs plus MIS go a long way to make the planning process "painless", i.e. less time consuming and more powerful than previously possible.

It should be pointed out that a Job Plan is REQUIRED even if these tools are not used. However it will be much easier to achieve the degree of detail and inter-related 'fit' between the various steps and actions *with* the tools.

The success of the company is closely tied to the success of its people; and your success is closely related to our success in completing contracts for the estimated costs.

The JOB PLANNING TOOLS in front of you, will help you succeed.

USE IT!

< end >