TITLE:
"FAST TRACK", OR HOW TO MOVE A PROJECT FAST

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ABSTRACT

Our company has been involved in several fast track projects during the past few years. Getting a chemical plant or any project designed and built in record time involves frustrations as well as rewards. The purpose of this paper is to share with the members of the Institute our recent experiences on this subject. Some specific examples will be offered.

WHAT IS A FAST TRACK PROJECT AND WHY BOTHER?

There is no real definition of what fast track means. Let us give an example. In the power generation industry, it takes over five years to plan, permit, design and build a power plant. In the chemical industry, a five year period is considered the time in which a chemical process becomes obsolete. In the power industry a three to four year period would be considered a fast track. In the chemical industry this time period would be considered unacceptable. For example, a fast track design for a chemical plant could be six months to one year from design to completion of construction.

For the purpose of this paper, we will propose that a fast track project is one which can be designed, permitted and built in less than a year. Depending upon the size and nature of the project, this can be a reasonable length of time or it can be pure madness.

There is a concept that a small engineering company can handle a fast track project just by virtue of being small and not having to contend with a lot of the "red tape" that can be associated with a large company. This is a myth. To be able to successfully complete a fast track project requires a system which incorporates a great deal of planning, discipline, coordination and attention to detail. It also requires a great deal of dedication and team work from the staff.

HOW IS A PROJECT RUN ON A FAST TRACK BASIS?

A typical project can be broken down into three main activities: design, equipment procurement and construction. A more detailed outline of these activities will be dealt with later in this discussion. Ideally, one activity cannot commence until the previous one is complete. This leisurely pace is not acceptable in a fast track project, which are generally completed by overlapping the various activities involved. The attached bar charts illustrate this principle.

Normally, a typical project requires very strict control to maintain budgets and schedules. Fast track projects require an even greater degree of control to assure that nothing is overlooked or falls through the cracks. This points to one of the most important keys to a successful fast track project; the need to maintain very rigid documentation control. This control is especially important when keeping a record of daily and weekly conversations with key personal such as vendors, client personal, and contractors. For example, if phone conversations are not documented, or fax/modem transmissions not kept on file, important details, and or changes to the project/process can be forgotten or left out which can easily happen in a fast track environment.

Strict procedures for documenting any associated correspondence will be a tremendous help, as well as providing a means for monitoring the progress and schedule of the project. One convenient way of monitoring the project can easily be accomplished with full drawing size (22" X 34") bar charts and flowcharts that can be displayed in an area where the whole staff can see them on a daily basis. This makes it easier to concentrate on portions of the project that need the most attention to meet the schedule.

Engineering companies such as ours generally have very elaborate procedures for carrying out projects, the preparation and issue of drawings, etc. It is not a good idea to by-pass these procedures for the purpose of carrying out a fast track project. What is really needed is a set of specific guidelines for the implementation of fast track projects, within the existing project administration framework. In a fast track project, the tough part is ensuring that these guidelines are being used. This may mean assigning key personnel in positions of keeping track of the procedures that are essential for the project to run smoothly.

Traditionally the process design is the part of a project which takes the longest and is the most conflictive. The ability to fast track a project depends upon being able to obtain an approved process design that will include process flow diagrams and P&ID's from the client. It is most important that the degree of process development, the "scope of the project" be known before committing to schedules which are not realistic. In any case, the overall project schedule must always include a hefty period of time for completion of process documents. This allotment of time will surely overlap with the time needed for equipment procurement and the mechanical design. The procurement of equipment and especially instrumentation should start soon the process design is near completion. There are usually a lot of changes made to the design during procurement of equipment/instrumentation due such facts as time for delivery, budget, and availability. During a fast track project, these changes have to be implemented as the design is being completed. So it is easy to see how the overlapping comes into play.

One place were a substantial amount of time can be "bought" for getting back on track is during the HAZOP review. The time involved for a HAZOP review should not be overlooked. It should be noted that, in a sense, the PHA requirements can be a blessing. In our experience one of the most damaging things that can be done to a project in terms of both schedule and budget, is changes in the process and scope. The discipline imposed by the PHA may help control this problem in the long run. However, the use of PHA is too recent and there is not a sufficient body of cases and examples to document their impact on project schedules.

An invaluable tool for project control, fast track or not, is the personal computer. Many programs are commercially available for project management, scheduling, etc. It is not within the scope of this paper to take sides as to which program is best. Suffice to say that it is up to the Project Manager to utilize the available tools to exercise proper control. In fact, any good spreadsheet will do, if properly used. Spreadsheets have been used for material balances, process calculations and simulation, project scheduling, cost control, etc. Several good articles on this subject have appeared in current chemical engineering publications. In today's technical world there is also the advantage of having process simulators that can run on a PC! Besides being an incredible tool in process design, a process simulator is also a very effective in cutting down the time needed for the process design.

SPECIFIC HINTS ON INDIVIDUAL AREAS OF DESIGN:

- **Mechanical Design**

Our project procedures call for a complete process design before a detailed mechanical design can commence. However, there are many instances in which the mechanical design can get started in parallel with the process design, this is a good example of the overlapping discussed earlier. For example, if major pieces of equipment are known, and the manufacturer/vendor can provide detailed drawings, their design in the project can be started right away.

Also, in my cases it is possible to start pipe design with partially completed P&ID's. This will involve, however, having to do portions of the piping over again, with the associated extra cost. This points out a major price that has to be paid in a fast track project, namely a higher engineering cost. To quote "Miller's Law"(*), in a fast track, out of the three important elements, cost, speed and quality, one must be sacrificed in order to successfully achieve the other two. There is nothing wrong with this as long as the client is aware of the implications and is willing to accept the cost.

Civil and structural design

Before this portion of the design can be started, the arrangement drawings must be final and approved. Again, this rule can be waived in some cases. For example, some projects involve the duplication of an existing facility where the approximate layout is already known. The use of mat foundations and "Hilti" bolts will expedite the design and construction of foundations and slabs. In other cases, an individual structure can be designed before the overall site design is complete.

As usual, this is risky business and great care and judgement must be exercised. Under no circumstances will the structural integrity ever be compromised.

Electrical and control system design

The design and construction of the electrical and control systems of the plant are usually done after the rest of the plant components. Therefore, the electrical systems are seldom critical path items. However, they should not be overlooked and if at all possible, their design should parallel the rest of the plant.

One important exception is those instruments which are mounted on piping, since their omission may hinder completion of pipe design and construction. The selection and specification of pipe mounted instruments and controls should proceed as soon as the P&ID's are complete, and in some instances, before this point. Another exception is that of long delivery components such as DCS, MCC's transformers, etc. These items should be identified early in the project.

(*) Named after Frank Miller, a semi-retired chemical engineering living in Jacksonville, Florida.

Equipment Procurement

While procurement is not a design activity per se, it is a part of the overall project development and cannot be overlooked. In fact, it is a crucial component of a fast track project. The best due diligence is speeding the design is an exercise in futility if the equipment is not available when needed by the construction contractor.

We need to go one step further. Not only is the equipment needed, but also the certified vendor prints. Without them, detail design simply cannot proceed very far.

As part of the initial project schedule, and before the schedule can be firmed up, the major equipment suppliers need to be contacted to determine and guarantee the availability of both equipment and vendor prints when they are needed. In some cases, the decision to select any given vendor will rest on ability to deliver, rather than price.

This further confirms Miller's Law in that if quality and time are to be optimized, price will go up. Notice we mentioned optimizing quality and time. By definition, a fast track project is one in which time is to be shortened as much as possible. And quality cannot ever be compromised, particularly in view of the current legal environment. Therefore, the only degree of freedom or variable left is cost, and experience has shown that it always goes up under these conditions.

WILL IT REALLY SAVE TIME?

Definitely, providing that the proper schedule is developed and that the proper procedures are established and observed. In fact, by definition, the purpose of a fast track schedule is to improve project completion versus the traditional approach.

WILL IT SAVE MONEY?

Yes! However, we need to qualify this answer. Fast track projects do involve a degree of apparent inefficiency related to the payment of overtime, duplication of efforts due to overlapping activities, and perhaps, worst of all, potential errors during construction. There is no question that engineering and construction costs will be higher as compared to a paced project.

However, over the life time of a project, substantial savings will be realized. We define project life time not only as the design and construction activities but the entire life of the process manufacturing facility. If a product can be brought to market ahead of the competition, or simply as soon as possible, a revenue stream will be established. In most cases, this revenue will more than pay for the additional engineering and construction costs involved.

WHAT ARE THE POTENTIAL RISKS AND PROBLEMS?

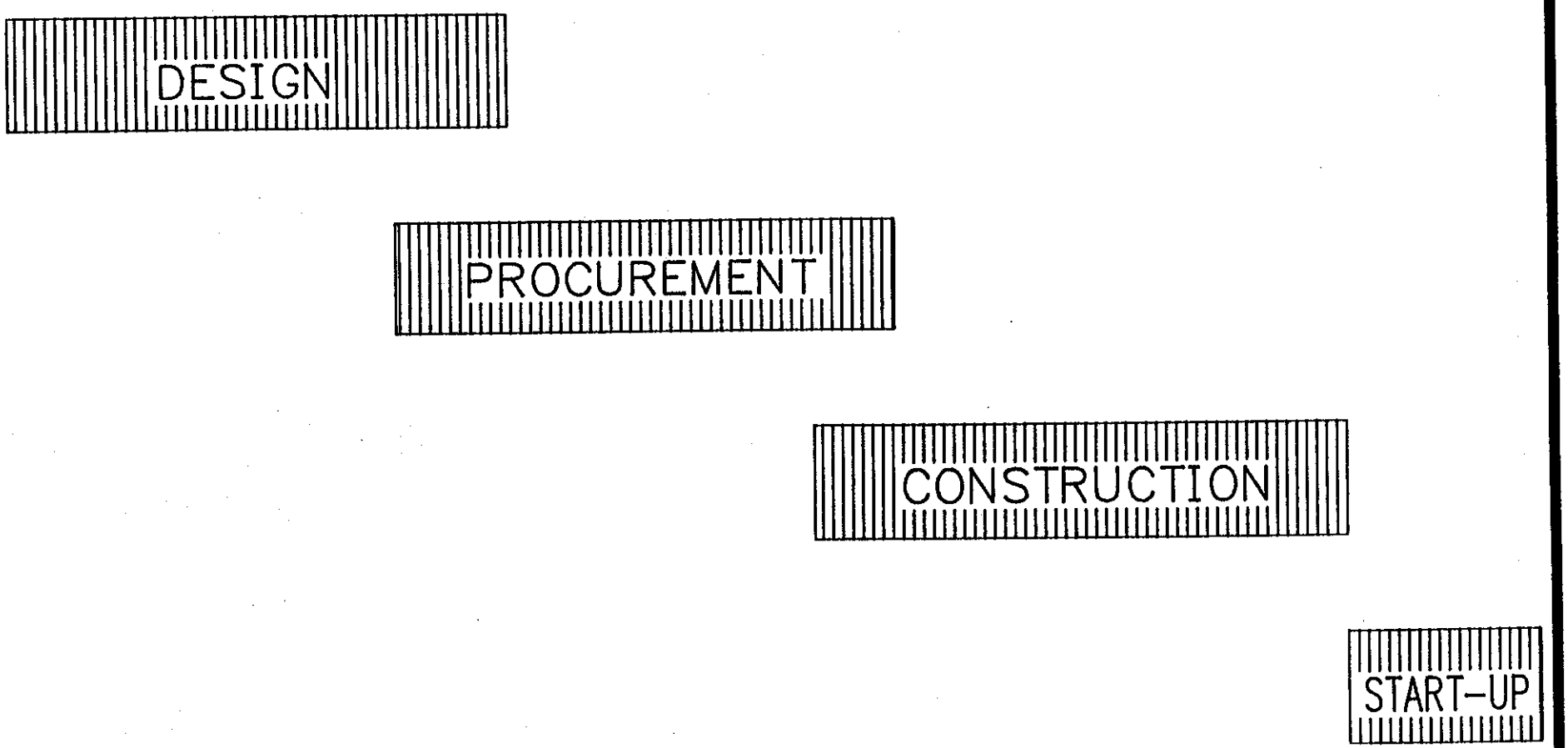
Many! For example, doing piping before completing P&ID's or pouring concrete before approved arrangement drawings are available is risky. As long as the risk is known, quantified and accepted by the parties involved, primarily the client, then it is acceptable. If the construction is done by a separate construction company, then the fast track nature of the project needs to be recognized and the proper accounting, financial and contractual arrangements need to be established.

In some projects we have taken immense risks at times and others resulted in some difficult client relations moments. But with the knowledge that they are possible, what we need is to set up a mechanism to assure their repeatability, without sacrificing quality control.

CONCLUSION

In view of some of the potential problems indicated above, why bother? Simple, as we saw above, it will save time, and time is money. This is the primary justification for the use of a fast track schedule. For a design company, in spite of the inconveniences, a fast project will free staff for the next one. In general, our experience has been a good one and we intend to continue pursuing this type of project activity in the future.

TRADITIONAL PROJECT SCHEDULE



FAST TRACK PROJECT SCHEDULE