

SCHEDULE-BASED CONSTRUCTION INCENTIVES

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ABSTRACT: Construction incentives can be useful devices to improve project performance. The use of schedule-based incentives is particularly attractive because it can result in substantial time and cost savings. Furthermore, the design and implementation of schedule-based incentives are relatively easy and inexpensive. They are especially applicable to projects for which timely completion is critical. Several different forms and combinations of schedule incentives are available, each having its own advantages. Schedule-based incentive targets vary from the simplistic, end-of-project types, to the more sophisticated intermediate milestones, with various combinations in between. Both bonus and bonus/penalty award schemes are used in a wide array of forms. Contractor participation in the development of schedule targets can enhance the chances for success of the incentive plan, yet such participation is not always sought by owners. Use of bonus-only schedule incentives is recommended whenever a perceived benefit from above average schedule performance exists. Bonus size should be substantial enough to capture the attention of the contractor's upper management. Exclusive use of penalties is counter-productive.

INTRODUCTION

The area of contracts is one aspect of project management that is in definite need of new ideas and tools to solve the many problems that plague modern-day construction. This assertion has been recognized and supported by a variety of institutions, including the Business Roundtable ("Contractual" 1982).

Construction contract incentives can be useful devices to improve project performance. It is possible to direct contractor's energies in any chosen direction by building incentives into key project objectives and identifying the right performance criteria.

Contractual incentives are the means by which an owner intends to achieve certain project goals (Stukhart 1984). Incentives are primarily used to align the contractor's motivation with the owner's project objectives. More specifically, incentives are used to effect the adoption of the owner's project objectives by the contractor. Ideally, contract incentives will motivate the contractor to produce a system that will meet or surpass performance goals, before a target date and within a target cost (Finchum 1972).

The benefits of incentive plans derive from a number of significant aspects. First, the potential for additional monetary reward enhances the contractor's performance, which influences performance. Incentive plans also can increase the level of management attention and favorably influence the selection of key personnel assigned to the project by the owner and contractor. In addition, incentive plans provide a way to achieve close corre-

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spondence between the owner's and contractor's objectives. In this regard, they require owners to define their objectives more clearly. They also encourage owners to communicate their objectives more effectively, both within their own organizations and to their contractors.

Incentive plans function by: (1) Identifying key project objectives; (2) establishing performance targets for the key project objectives; (3) measuring actual performance against these targets; and (4) rewarding the contractor for performances that achieve set targets and, possibly, penalizing him for those that do not.

Contractual incentives are mainly used to:

1. Reduce overall contract cost.
2. Reduce overall project duration.
3. Encourage improved performance in areas such as productivity, quality, safety, management, and innovation.

An incentive study was recently conducted by the Texas Transportation Institute for the Texas Department of Highways and Public Transportation ("Incentives" 1988). The study concluded that schedule incentives in construction contracts can significantly reduce project duration and produce substantial savings (millions of dollars each year). The TTI researchers urged state agencies to make use of incentive contracts to slice project duration. They suggested that the agencies offer a daily bonus for early completion.

Given the substantial time and cost savings that can be gained from the use of schedule incentives in construction contracts, and the relative ease and inexpensiveness of their implementation, this paper focuses on the use of incentives to promote improvements in schedule performance of contractors. The information presented in this paper is primarily based on a study concluded recently by the writers, entitled "Unique features of construction contract incentive plans," (Ibbs and Abu-Hijleh 1988). In the study, eight complete plans were reviewed. Details were actually reviewed from 19 contracts and 26 parties. In addition to identifying and discussing the various features of schedule incentives, this paper provides examples of real-life application of these features in construction projects.

Schedule Incentives

The principle behind schedule incentives is straightforward. They are designed to reward contractors for early completion of work and, possibly, to penalize them for late completion. Liquidated damages are a form of schedule incentives in which the contractor is charged a certain amount of money per day beyond a specified date. Some view liquidated damages as a negative incentive, while others view them as a form of protection against more substantial penalties for late completion.

Schedule incentives are especially applicable to projects for which a certain date of completion is critical. In such cases, early completion produces sizable savings for the owner and late completion results in significant costs. Schedule incentives are especially valuable for profit-producing enterprises. If the planned project is one for which early completion produces a sizable and early return on investment, the owner can afford to share a portion of the expected benefit and create an incentive for the contractor. Finally, schedule incentives can also be useful when completion of certain intermediate project

tasks or stages by a certain time is absolutely necessary for timely project completion.

In the remainder of this section the following aspects of schedule incentives are presented:

- Types of schedule targets.
- Types and forms of incentive awards.
- Owner-set schedule targets versus negotiated ones.

Types of Schedule Targets

Incentive plans targeting schedule may be structured such that bonus and penalty determinations are based on: (1) Final project completion date; (2) intermediate milestone periods; (3) intermediate physical completion milestones; or (4) a combination of final and milestone assessments. When milestone periods are used, the goal is to maximize performance during each of the predefined time segments. Physical milestones, on the other hand, target completion of certain physical systems by specified dates.

Incentive plans targeting a project completion date have the advantage that bonuses and penalties are directly linked to the specified completion date. Conversely, milestone plans involve the risk that bonuses will be paid for the achievement of individual milestones, but final results will nonetheless be disappointing.

Under a milestone plan, a project is broken down into parts and a concentrated effort is made to control and complete each part. This enhances the chances of achieving overall project completion on time. Thus, milestone plans require greater faith that intermediate schedule targets will add up to the sought-after project completion goal.

Considering only the incentive plan itself, plans targeting completion dates require the least administrative effort. The administrative effort required for a milestone plan is a function of the number and type of milestones involved. The constant and steady flow of short-term schedule milestones, as opposed to overall contract completion, causes the contractor to do a better job of managing, tracking, and documenting construction activities.

The most significant drawback to incentive plans with end-of-project schedule targets is the potential loss of viability. If circumstances vary enough between project outset and completion, the schedule target may then become too hard, or sometimes too easy to achieve. The longer the project duration, the greater the risk of such an occurrence. Other events may complicate matters. For example, late engineering might preclude the achievement of project completion targets.

Milestone plans can provide more flexibility, both in their design and administration. They can be designed to assure plan viability by responding to actual conditions and performance. They normally establish a number of notional schedule targets spaced across the project duration, and have bonuses associated with each. A variation on this defines schedule targets for the early stages of a project. Targets for the remainder of the project are developed on a "rolling basis" as the project unfolds. This approach is especially suitable for long-term and ill-defined projects. It perhaps represents the ultimate in flexibility. However, increased administrative expense and difficulty may result from employing such a scheme.

The choice, or balance, between end-of-project and milestone schedule

targets depends on several considerations. Project duration represents a significant one. Short-duration projects will normally preclude the opportunity to conduct frequent assessments of schedule progress. Other factors that may enter into the selection between project completion and intermediate milestones as incentive targets include:

- The owner's project management philosophy.
- The technical and managerial sophistication of the owner and contractor.
- The characteristics of the project at hand.
- The owner-contractor relationship.

Because of the administrative effort required, milestone incentive plans do not lend themselves well to short-duration projects. A one-year execution span might represent a reasonable "rule of thumb" minimum for their application.

Types and Forms of Incentive Awards

Earlier research by the Construction Industry Institute's Contract Task Force (Ashley and Workman 1985) demonstrated that positive incentives contribute to improved project results, while negative incentives generally hamper project performance. Positive incentives normally encourage positive actions, behavior, and relationships. Contractors' energies are directed toward developing more effective ways to achieve the project objectives. Negative incentives, at best, result in defensive performance. The focus may become on avoidance of penalties accompanied by ongoing preoccupation with potential claims and adversarial relationships. Project administration then becomes more difficult and contentious.

In the following paragraphs, discussion will focus on the use of bonus-only versus bonus/penalty schedule incentives by the companies that contributed to the study, and on the forms that these incentives take. All the incentive plans reviewed included targeted scheduling and bonus potential. Many also provided for penalties or fee reductions. None had a penalty-only provision.

The forms that these bonuses and bonuses/penalties took depended on contract type. This is because incentives schemes under lump-sum contracts typically targeted schedule as the sole incentive parameter. Conversely, incentive schemes under cost-plus contracts typically targeted schedule as one of two or more incentive parameters. About 70% of incentive applications reviewed involved cost-reimbursable contracts, with the remaining 30% involving lump-sum and guaranteed-maximum contracts.

In lump-sum contracts, schedule incentives exhibited two variations of the classical per diem bonus/penalty:

- Per diem bonus for each day of early completion.
- Lump-sum bonus for completion by a specified date, and a per diem penalty for late completion with a cap on total penalty.

Where per diem penalties were called for, the maximum possible penalties for late completion placed a significant portion of the contractor's fee at risk, often exceeding 80%. The ceiling on total penalty assured the contractor that the limit of his liability did not exceed his fee.

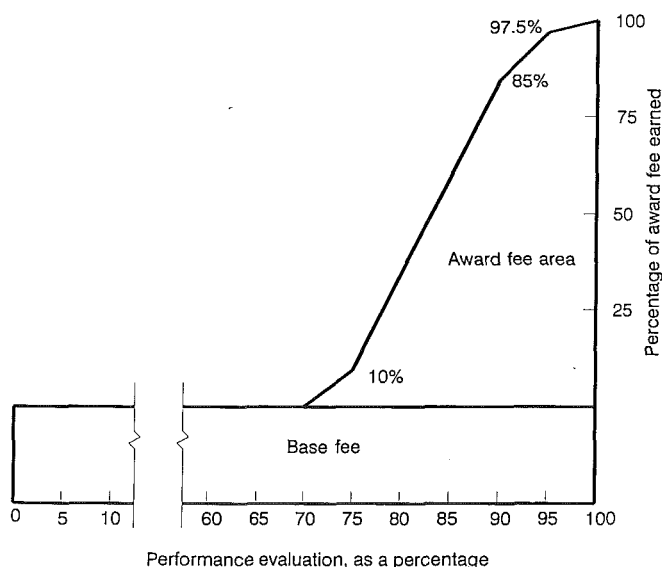


FIG. 1. Typical Award Fee Schedule (Smith et al. 1975)

In cost-plus environments, schedule incentives took more sophisticated forms, mostly because the schedule was always targeted in combination with other project objectives. Schedule-incentive provisions went hand in hand with cost-incentive provisions. Frequently, quality, safety, general performance, productivity, or a combination thereof also was targeted by the same incentive program.

Most of these multiparameter incentive plans assigned relative weights to the various parameters. These weights were then used to translate parameter-specific performances into an overall project performance grade. On the basis of this overall grade, the incentive awards were then determined. Schedule, along with cost, was always assigned the highest weight, if all incentive parameters were not equally weighted. A typical weight for schedule was 40%.

In connection with cost-plus contracts, incentive plans did not target a completion date solely, but also emphasized timely planning and execution of key project tasks. Typically, bonus/fee reduction systems were used. Depending on contractor performance, the bonus and portion of fee at risk were earned or forfeited. By producing work that met minimum specified standards, the contractor would earn a base fee. In the event of substandard performance, the contractor would lose some or all of the fee at risk. Contractor performance levels surpassing the minimum standards were rewarded with bonuses that were often as large as the fee. The actual fee awarded under such a scheme is commonly referred to as the incentive fee and the contract is known as cost-plus-incentive-fee.

Another award system reflected some owners' belief that a contractor should receive a base fee regardless of his performance level. An example of such a system is graphically represented in Fig. 1. Under such an arrangement,

known as a cost-plus-award-fee contract, superior performance by the contractor is rewarded with an additional award fee. In one instance, the contractor received bonuses totaling an award fee that was seven times as large as the base fee. Because of the high payoff potential, the base fee was often abnormally small.

Owners and contractors alike suggested that the size of the bonus should be set at a level reflecting the benefits to be derived by the owner from early completion.

As a final note, special care has to be taken if the schedule incentive is in the form of a bonus rate and other bonus rates are employed to promote other project objectives. Capping bonuses associated with each project objective may be needed to provide a check and balance so the contractor does not overemphasize the parameters with the highest bonus return at the expense of the others. A cap on the total bonus may also be used to achieve balance.

Owner-Set Schedule Targets versus Negotiated Ones

Important to the success of any incentive program is that the contractor perceives the program's goals as being attainable. According to Ashley and Workman (Ashley and Workman 1985), the contractor's motivation to perform will be maximized when:

- The contractor believes that the performance at the desired level is possible.
- The contractor believes that performance will lead to certain positive outcomes.
- The contractor perceives the outcomes as attractive.

When incentive schedule targets are unilaterally set by the owner, the contractor may accept or reject the plan, but has little or no opportunity to influence schedule targets, payment terms, or other details. Negotiated targets are developed jointly by the owner and contractor.

Owner-set targets may involve a risk of lesser commitment by the contractor. This is less likely when the contractor has been involved in establishing the targets and perceives them to be achievable. Negotiated targets result in greater ownership and commitment by the contractor, but take longer to establish and might delay project start somewhat.

EXAMPLES OF USE OF SCHEDULE INCENTIVE

Example One

The first example is an incentive plan designed by a construction management firm. The firm used the plan on several projects with only minor adjustments for each project's particular needs. The construction manager, as a third party, was in a good position to convince contractors of the objectivity and fairness of the incentive program he employed.

The incentive plan was used on four projects:

1. A new grassroots paper mill, \$600,000,000, with a construction duration of about 32 months.

TABLE 1. Breakdown of Timeliness Category in Example One

Timeliness (schedule)—40% (1)	Weight (2)
Estimating submissions	1
Scheduling submissions and revisions	1
Costing details	2
Costing projections and tracking	5
Subcontracting recommendations	1
Purchasing recommendations	1
Delivery	1
Expediting	1
Recommended "X" company construction equipment purchases	1
Forward purchase recommendations	1
Labor problem notification	1
Manning the project	5
Anticipating delays and ability to recover	5
Maintenance of schedule projections	5
Total	31

Note: Weight Grade = $\frac{\quad}{31} \times 40 =$

2. A hog fuel boiler, about \$50,000,000, with a construction duration of about 22 months.

3. A pulp mill expansion, multimillion-dollar value, with a construction duration of about 12 months.

4. A pulp mill expansion, multimillion-dollar value, with a construction duration of about 12 months.

With the exception of the grassroots paper mill project, the contracts were for construction only. In the case of the grassroots paper mill project, the application was for turnkey work. In all cases, the contracts were cost-plus-award-fee.

With this incentive plan, a project was divided into six to eight grading periods. Performance for each period was evaluated on the basis of the following weighted categories:

1. Timely completion (schedule)—40%.
2. Control and reduction of cost—40%.
3. Quality of work—20%.

Each of the categories was further expanded into subcategories. Table 1 illustrates the grading procedure for the timely completion category. Note that the criteria listed in Table 1 are not all schedule-related, per se. Rather the timeliness and level of contractor efforts are stressed. In other words, the timeliness category recognized the importance of satisfactory contractor input and efforts, in contrast to the usual tendency to focus on desirable output or results. The incentive fee was apportioned to the different grading periods, according to a schedule that was defined in the contract documents. The percentage allocated to a grading period represented the maximum al-

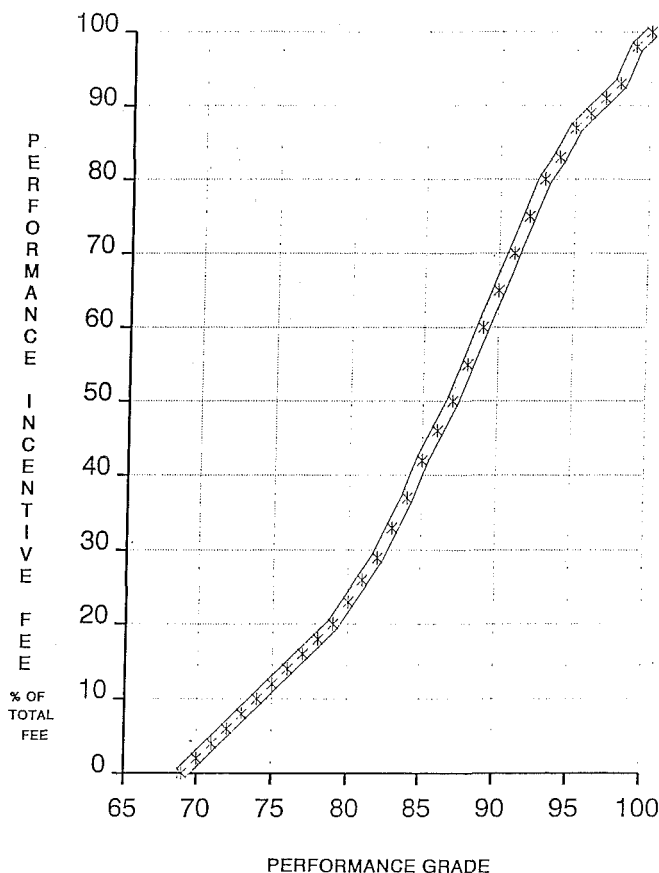


FIG. 2. Periodic Performance Incentive Fee Relative to Performance Grade

lowable percentage of the total fee to be considered for that period. Each grading period stood on its own.

The contract documents contained a schedule of "performance schedule fee." A graph of that schedule is shown in Fig. 2. After determining the performance evaluation grade, which is the sum of the weight grades for all three incentive categories, the incentive fee percentage was obtained from this schedule. The incentive plan provided for a variable fee of as much as a specified maximum allowable incentive fee; 100% of the fee, however, was at risk.

The plan was administered by five to six people, members of the owner's and project manager's teams. They performed the periodic reviews of the contractor's performance and arrived at a performance evaluation grade for each period. The level of effort to administer the plan was minimal.

Measurable improvements were achieved, especially in schedule and cost, at no additional cost to owner or contractor. A shortcoming of this incentive plan, however, is that it loses its effectiveness on short-term projects.

Example Two

The second example involves a \$65,000,000 precious metal processing facility. The owner negotiated with the contractor a target price. The owner's business division judged the amount of benefit that could be received from early start-up of the plant to be about \$3,000 per day, based on the projected additional revenue stream. To capture this, the owner employed a customized unilateral (bonus-only) incentive program of two parts:

1. Per diem bonus (\$XXX) for each day of early completion as measured against an agreed date. This bonus had a cap, which was based on the benefit received by the owner for early start-up.
2. The second part was based on the target price and was in the form of saving sharing. The contractor received a percentage of the underrun and the owner, the balance.

The owner and contractor agreed that the total bonus to be earned by the contractor would also have a cap. The cap on the total bonus was set at a lower level than the sum of the two individual caps. The reason for putting caps on the schedule and cost incentives was to provide a check and balance so that the contractor did not overemphasize one at the expense of the other.

The schedule was a negotiated one. The tricky part was what was meant by the completion date; they eventually defined this as that point in time when all equipment was set and checked, and all loops checked, tested, and accepted. Completion date did not include start-up or process refinement activities.

The unique feature of this scheme was that the owner requested that 10% of the bonus earned by the contractor be distributed to key personnel assigned to the project. The owner had to check with the contractor's top management to ensure that such an award was within the contractor's compensation policy. The contractor had assembled a team of professional management people who had worked together immediately prior to this project on two earlier and similar jobs. The owner elected to award bonuses to the key personnel because a lot of mining work was being bid at the time this project was bid. He feared that key people could be pirated by other contractors for other jobs. So the owner elected to create an incentive not only for the contractor as a company, but for the key people as well to keep them on that job throughout the project.

The contractor earned the maximum bonus of \$1,700,000. The earned bonus resulted principally from schedule savings (about three months). The contractor also achieved a cost underrun of about \$8,000,000. Key people who shared in the bonus included the contractor's purchasing manager, an assistant purchasing manager, the subcontractor manager, the project manager, two project engineers, the quality control manager, two scheduling engineers, two superintendents, the cost control manager, and the cost control engineer, among others. The maximum bonus awarded to one person was \$35,000. Several other people received \$20,000 and \$15,000 bonuses. Approximately \$180,000 in bonuses were awarded directly to 12 contractor employees.

The estimated production basis savings from the early start-up was over \$3,000,000 (about \$1,000,000 per month) for the owner. The project was

an excellent job and, in the thinking of the owner, the time and cost savings were directly attributable to the incentive plan.

Example Three

This project involved the installation of a steel jacket and drilling platform in 760 ft of water in 18 months. The lump-sum contract, worth a little less than \$100,000,000, involved engineering, procurement, fabrication, transportation, installation, and offshore hook-up. An incentive scheme was employed to address what the owner described as schedule maintenance/commitment.

The incentive plan provided for a \$250,000 bonus if the contractor was ready for load-out of the completed jacket, piles, and deck by September 15, 1986 (almost halfway through the project), before the weather changed. In the event the contractor failed to be ready for load-out on or before October 1, 1986, a penalty of \$15,000 per day would be assessed until and including the actual date on which he was ready for load-out. The penalty was not to exceed \$1,250,000.

The incentive was not aimed at the overall schedule for the project. But if the middle-of-the-project, jacket-readiness date was met, there was a good probability that project completion would have been on schedule. The contractor did not meet the milestone jacket-readiness date, but completed the project on time. Despite the overall success of the project and its timely completion, the contractor was penalized for missing the middle-of-the-project milestone. The contractor felt that it was unfair to penalize him, especially when he had delivered the project on schedule. But there was no recourse.

This example illustrates how strict observation of rigidly set targets can eclipse the key project goals that the targets are supposed to secure.

Example Four

The owner in this case had traditionally used bonus-only incentive plans targeting total project cost and schedule. Such plans were easy to measure and administer. But as the owner took on long-term and complex projects, the risk of losing viability with such plans grew. Thus, the owner developed his incentive plans to include multiple schedule milestones. This had the desirable effect of enhancing viability, but also required greater administration and subjectivity.

The major features of the milestone incentive plan are:

- Projects are divided into a series of key milestones, and a bonus is associated with each.
- Details are developed as project develops.
- Bonuses are paid, banked, or lost as milestones are reached.
- Integration of design and construction and good design performance that enhances construction are awarded.

Such a milestone plan was used on a grass roots petrochemical plant. The contract called for the design and construction of the plant under a reimbursable cost arrangement. The project was expected to last five years from start of engineering to completion. Under a conventional incentive plan the contractor would not receive any bonus money until construction was com-

TABLE 2. Major Milestones from Example Four

Milestone number (1)	Description (2)
1	Detailed engineering sufficiently completed to permit 80% of area paving to be installed.
2	Orthographic drawings 85% complete and catalogs of required isometric drawings prepared by piping key plans.
3	Instrument loop diagram 100% complete.
4	Issue 80% of all isometrics and sufficient material to permit piping fabrication.
5	Issue all equipment structures and pipe-rack drawings.
6	Timely placement of purchase orders for major bulk materials to satisfy optimum, overall project schedule.
7	Completion and review of required contractor-developed procedures.
8	Completion of sufficient detailed engineering to support effective field start-up.
9	Completion of 95% of detailed engineering.
10	Completion and acceptance of a detailed plan for temporary facilities at _____ and _____ Bay so that site preparation work can begin.
11	Formal placement of a subcontract for site preparation.
12	Field planning (implementation of computer systems, procedures manual, etc.).
13	Industrial relations policy established.
14	Award of subcontracts and procurement of sufficient materials to support an effective field start at _____ by October 31, 1981.
15	Mobilization of field management organization.
16	Construction safety.
17	System turnovers.
18	Schedule (field mechanical completion dates).
19(a)	In depth detailed construction planning—continuation of milestone 12.
19(b)	Demonstrated productivity effectiveness—productivity improvement program and productivity performance.
19(c)	Minimization of job-end project construction overhead costs.
20	Recovery of back charges.

pleted. Such a plan would lose credibility with the contractor if applied to a five-year project. Therefore, a milestone plan was tailored and adopted specifically for the petrochemical plant.

The incentive plan was bonus-only. The novel feature of the plan was the establishment of a constant steady flow of short-term (milestone) incentive goals. The major features of this incentive plan were:

1. The plan provided bonuses geared to achievement of discrete accomplishments (milestones).
2. Milestone definitions and corresponding target dates were developed on a "rolling basis." This involved establishing milestone details and, as the project evolved, refining them to take into account the project team's actual capabilities and performance.
3. Milestone target dates were distributed over the entire span of the project.
4. After the draft milestone was prepared by the owner, it was reviewed by

TABLE 3. Sample Submilestones from Example Four

Milestone number (1)	Submilestones (2)		Target (3)
1	1	Engineer to construct paving in area A	May 15, 1982
	2	Engineer to construct paving in area B	June 01, 1982
	3	Engineer to construct paving in area C	Mar. 15, 1982
	4	Engineer to construct paving in area D	Mar. 05, 1982
	5	Engineer to construct paving in area E	Aug. 01, 1982
	6	Engineer to construct paving in area F	Aug. 01, 1982
	7	Engineer to construct paving in area G	July 15, 1982
	8	Engineer to construct paving in areas H, J, K, and L	Aug. 15, 1982
	9	Engineer to construct paving at _____ bay	June 11, 1982
6	1	PO's for bulk pipe material	Aug. 31, 1981
	2	PO's for bulk electrics (cables)	Apr. 01, 1982
	3	PO's for bulk electrics (other)	Nov. 15, 1982
	4	PO's for bulk instruments (piping)	July 20, 1982
	5	PO's for bulk instruments (cables)	July 06, 1982
	6	PO's for bulk instruments (other)	Nov. 09, 1982
18	1	25% construction progress	Jan. 30, 1982
	2	50% construction progress	Nov. 20, 1983
	3	70% construction progress	June 17, 1984
	4	85% construction progress	Oct. 21, 1984
	5	Mechanical completion	May 31, 1985
19.2	1	Productivity at 50% construction progress	Nov. 20, 1983
	2	Productivity at 70% construction progress	June 17, 1983
	3	Productivity at 85% construction progress	Oct. 21, 1984
	4	Productivity at mechanical completion	MC

the contractor. This enabled the contractor to "buy in" to the milestone definition, thereby enhancing the milestone's credibility.

5. The plan consisted of 20 major milestones which were further divided into 132 submilestones. Table 2 lists the 20 major milestones.

6. The contractor could earn significant bonuses—as much as 150% of his fixed fee. Of this total, approximately 70% was related to construction or construction planning.

7. When a milestone was met the bonus was paid immediately. Also, once a milestone target date was missed, the corresponding bonus payment was lost forever.

8. The administration of the plan was unilateral. The owner's project team made all final decisions or interpretations, subject to the approval of the project executive. An individual project engineer or field engineer was assigned responsibility for administering each milestone.

9. Milestone target dates were not adjusted for ordinary contract changes or their cumulative effect.

10. Bonuses were tied to the achievement of the 132 submilestones. These submilestones encompassed important activities in the areas of detailed engineering, procurement, construction, schedule, cost, safety, quality, productivity, and industrial relations. Examples of these submilestones are shown in Table 3.

By project completion, 180 submilestones had been defined. The apparent increase in the number of submilestones was a direct result of the owner's philosophy of developing milestone details, and corresponding target dates, as the project evolved. The administrative effort required was substantial and time-consuming. The owner estimated that the equivalent of two additional full-time management personnel were needed on this project. This was the most expensive plan this owner had ever implemented, but it more than paid for itself. It forced an improvement in the owner's management performance. The need to select suitable milestones and to clearly define them in words forced the owner's team to make an intensive analysis that might not otherwise have been done.

The project was completed five months ahead of schedule, with costs 10% under budget. The 18,000,000 man-hour project had superior quality and safety performance (zero fatalities or serious injuries). The final cost of the plant was about \$600 million. The contractor was awarded 80% of the maximum possible bonus, equivalent to about 120% of his fee.

SUMMARY AND CONCLUSIONS

Contract schedule incentives can be useful management tools for a broad spectrum of projects. One owner who contributed to this study claimed that he has always beaten the construction schedule when using an incentive program. He has consistently achieved productivity improvements in the range of 25%–35%, and schedule improvements in the range of 15%–25%.

On the basis of the findings of this study, the following recommendations are offered mainly to owner organizations:

1. Use of bonus-only schedule incentives is recommended whenever a perceived benefit from above-average schedule performance exists. If provisions for penalties have to be made, potential bonuses should be greater than, and at least as likely as, penalties.
2. Do not employ incentive schemes that make use of penalties exclusively (penalty-only).
3. Several different forms and combinations of schedule incentives are available, each having its own advantages. Effective application of schedule incentives requires that the forms that best respond to the specific project requirements are employed.
4. Relate the flexibility of schedule targets to the extent of project scope definition and adequacy of planning.
5. Handle changes promptly and efficiently, taking into account any effects that they may have on incentive-plan targets.
6. Invite the contractor to participate in developing realistic and achievable schedule targets.
7. Make bonus amounts substantial enough to capture the attention of the contractor's upper management. Twenty-five to 50% of the standard contractor fee is a general rule-of-thumb minimum.

Incentives are not right for every project, but they are being used more frequently because of their success. Some effort may be required to administer the plan, but use of existing project-control systems and information tends to minimize this required effort. Clearly, the payoff of this contract administration device is sufficient to warrant the attention of more owners and construction managers.

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