# Cost Control

Progress Measurement

# Introduction

- Once the execution of the project starts, the project team
  must periodically report their progress on each task.
- Since the nature of each task varies, no single reporting method is suitable, and several methods of measuring progress are required.
- The six most common methods are presented in.

# Methods of Measuring Work Progress

1. Units Completed
2. Incremental Milestone
3. Start/Finish
4. Supervisor Opinion
5. Cost Ratio
6. Weighted or Equivalent Units

# Method 1: Units Completed

- Applicable to tasks that involve repeated production of easily measured pieces of work, when each piece requires approximately the same level of effort.
- Wire pulling is a task where accomplishment is easily measured in terms of linear meters of wire pulled. If the work for pulling a certain type of wire is contained in a single control account, the units completed method can be applied.

# Examples

- 10,000 linear meters are to be pulled, 4000 LM have been pulled, percent complete = 4000/10000 = 40%
- Placing and finishing reinforced concrete Progress would normally be reported on the basis of cubic meters of concrete placed and finished, or on the number of square meters of finished surface

# Method 2: Incremental Milestone

- method is applicable to any control account that includes subtasks that must be handled in sequence.
- The task is segmented into subtasks and each is assigned an increment of progress for the entire task. Completing a subtask is the achievement of a milestone.
- The milestone percentage is normally based. on the number of workhours required

# Example: Establishing Rules of Credit for installing a major vessel in an industrial facility

| Task | Incremental Progress | Cumulative Progress |
|---|---|---|
| Received/ inspected | 15% | 15% |
| Setting complete | 20% | 35% |
| Alignment complete | 15% | 50% |
| Internals installed | 25% | 75% |
| Testing complete | 15% | 90% |
| Accepted by owner | 10% | 100% |

# Method 3: Start/Finish

- Applicable where no intermediate milestones can be defined or where the effort/time required is very difficult to estimate.
- Examples include planning activities, flushing and cleaning, testing, and major rigging operations.

# Method 3: Start / Finish

- In the start/ finish approach, a percent complete is arbitrarily assigned to the start of a task, and 100 percent when the task is finished.
- A starting percentage of 50 percent is reasonable for short duration, lower-value tasks. Tasks with long duration or a high value, 20-30 percent would probably be used. Percentage affects progress payments, and an owner will hesitate to recognize too much completion in advance.
- For very short tasks, the start/finish percentages are usually 0 percent/ 100 percent.

# Method 4: Supervisor Opinion

- Supervisor simply makes a judgment of percent complete.
- This is a subjective approach and should be used only for relatively minor tasks and only where developing a more objective status is not feasible.
- Examples include dewatering, temporary construction, architectural trim, and landscaping are candidates for application of this approach.

# Method 5: Cost Ratio

- Applicable to long duration tasks or that are continuous during the life of a project, and which are estimated and budgeted on bulk allocations of money and workhours rather than on the basis of production.
- Examples include project management, quality assurance, contract administration, and project controls
- **% complete = $\frac{\text{actual cost or workhours to date}}{\text{forecast at completion}}$**

# Method 6-Weighted or Equivalent Units

- applicable when the task being controlled involves a long
  period of time and is composed of two or more overlapping
  subtasks. each with a different unit of work measurement.
- Structural steel erection provides a good example of where this this method may be applied.

# Method 6-Weighted or Equivalent Units

- Structural steel is normally estimated and controlled by using tons as the unit of measure. However, each of the subtasks have a different unit of measure.
- Each subtask is weighted by task level of effort (usually workhours) These weights are called "rules of credit.“
- As quantities of work are completed for each subtask, the quantities are converted into equivalent tons The total weight of structural steel in this account is 520 tons.

# Rules of Credit Example for Structural Steel Installation

| Allowed Credit | Subtask | Total U/M | Total Quantity | To-date Quantity | Earned Tons |
|---|---|---|---|---|---|
| 0.02 | run foundation bolts | each | 200 | 200 | 10.4 |
| 0.02 | shim | % | 100 | 100 | 10.4 |
| 0.05 | shakeout | % | 100 | 100 | 26.0 |
| 0.06 | columns | each | 87 | 74 | 26.5 |
| 0.11 | beams | each | 859 | 45 | 3.0 |
| 0.10 | cross braces | each | 837 | 0 | 0.0 |
| 0.20 | girts and sag rods | bay | 38 | 0 | 0.0 |
| 0.09 | plumb and align | % | 100 | 5 | 2.3 |
| 0.30 | connection | each | 2,977 | 74 | 3.9 |
| 0.05 | punch list | % | 100 | 0 | 0.0 |
| 1.00 | Steel Totals | ton | 520 | - | 82.5 |

# Example

- Earned quantity = (allowed credit) * (summary quantity) x (quantity to date) / (total quantity)
  - earned tons beams = (0.11) * (520 tons) * (45 each/859 each) = 3.0 tons
  - percent complete = 82.5 tons / 520= 15.9%
- A variation of this approach uses equivalent units for each subtask.
- In the example above, each subtask item would be given a unit of measure that in equivalent ton.
  For example, each beam would have an equivalent ton value determined as follows:
  - beam equivalent ton = (0.11 allowed credit)(520 tons)/(859 beams) = 0.067 tons/beam