

Section 4

Project Planning and Scheduling

Project Planing and Scheduling

4.1 Importance of Planning

It is an old business axiom that time is money. Therefore, planning future events and scheduling them, so they are accomplished with a minimum of time delay is an important part of the engineering design process. For large construction and production projects, detailed planning and scheduling is a must. Computer-based methods for handling the large volume of information have become commonplace. However, engineering design projects of all magnitudes of scale can profit greatly by applying the simple planning and scheduling techniques discussed in this chapter.

One of the most common criticisms leveled at the young graduate engineer is an overemphasis on technical perfection of the design and not enough concern for completing the design on time and below the estimated cost. Therefore, the planning and scheduling tools presented in this chapter can profitably be applied at the personal level as well as to the more complex engineering project.

In the context of engineering design, planning consists of identifying the key activities in a project and ordering them in the sequence in which they should be performed. Scheduling consists of putting the plan into the time frame of the calendar. The design process generally is divided into the following phases.

- Feasibility study
- Preliminary design-the concept phase
- Detail design
- Production phase
- Operational phase

Usually, a detailed design review is conducted at the end of each phase to establish whether the results warrant advancing into the next phase. The alternatives may be to repeat the phase or abandon the project. Frequently, well-defined decision points or milestones are established partway through a phase in order to provide a target to strive for and a way to control the project.

The major decisions that are made over the life cycle of a project fall into four areas: performance, time, cost, and risk.

- Performance-The design must possess an acceptable level of operational capability or the resources expended on it will be wasted. The design process must generate satisfactory specifications to test the performance of prototypes and production units.
- Time-In the early phases of a project the emphasis is on accurately estimating the length of time required to accomplished the various tasks and scheduling to ensure that sufficient time is available to complete those tasks. In the production phase the

time parameter becomes focused on setting and meeting production rates, and in the operational phase it focuses on reliability, maintenance, and resupply.

- Cost-The importance of cost in determining what is feasible in an engineering design has been emphasized in earlier chapters. Keeping costs and resources within approved limits is one of the chief functions of the project manager.
- Risk-Risks are inherent in anything new. Acceptable levels of risk must be established for the parameters of performance, time, and cost, and they must be monitored throughout the project.

The most crucial step for planning is the preliminary design phase. At its completion the design concept has been formulated and must be expressed in terms of performance standards, a time schedule, a cost estimate, and a risk assessment. At this stage, performance characteristics are usually the deciding factors in the tradeoff studies.

The first step in developing a plan is to identify the activities that need to be controlled. The usual way to do that is to start with the system and identify the 10 or 20 activities that are critical. Then the larger activities are broken down into subactivities, and these in turn are subdivided until you get in a hierarchical fashion from the system to the subassembly to the component to the individual part.