April 1998

Cost Engineering

The International Journal of Cost Estimation, Cost/Schedule Control, and Project Management

Our Vision: Advancement of Cost Engineering Through Total Cost Management

Eagleton Federal Building
St. Louis, MO

COST ENGINEERING
Vol. 40, No. 4/April 1998

Cost Engineering (ISSN: 0274-9696) is published monthly by AACE International (AACE, Inc.) 209 Prairie Ave., Suite 100; Morgantown, WV 26505 USA. Telephone: (304) 296-8444 or 800-858-COST. Fax: (304) 291-5728. Periodicals postage paid at Morgantown, WV, and at additional mailing office. **POSTMASTER: Send address changes to AACE International; 209 Prairie Ave., Suite 100; Morgantown, WV 26505 USA.**

Single copies: $8 for members, $12 for nonmembers (both +shipping), excluding special inserts available to AACE members only. Subscription rates: United States, $52/year; all other countries, $68/year. Overseas airmail delivery is available at $95. Subscriptions are accepted on an annual-year basis only.

Cost Engineering is a refereed journal. All technical articles are subject to review by a minimum of three experts in the field. **Cost Engineering** is indexed regularly in the Engineering Index, Cambridge Scientific Abstracts, and in the ABI/Inform database.

Cost Engineering and **AACE Transactions** are available on CD-ROM, microfilm, and microfiche from University Microfilms International, Dept. FA, 300 North Zeeb Road, Ann Arbor, MI 48106.

COST ENGINEERING DEADLINES: Material for Cost Engineering must be received at least 7 weeks in advance of the issue date. Send to: Editor, 209 Prairie Ave., Suite 100, Morgantown, WV 26505 USA. Deadlines do not apply to technical papers.

PUBLISHER:
AACE International

MANAGING EDITOR:
Kathy Deweese

EDITOR/GRAPHIC ARTIST:
Marvin Gelhausen

ADVERTISING REPRESENTATIVE:
Network Publications, Inc./phone 410-235-0500

Cost Engineering

ESTABLISHED 1958

DEPARTMENTS

TECHNICAL ARTICLES

FEATURE ARTICLES

On the Cover: The Eagleton Federal Building in St. Louis, MO, USA, the largest courthouse in the US. Photo courtesy of Saflex plastic interlayer.

Schedule Hierarchy—An Overview

Sarwar A. Samad, CCE—
Chair, Planning and Scheduling
Committee

The ability to manage and control a project is of utmost importance for its success. Planning and scheduling play a vital role in the successful completion of any project, and provide a way to achieve and maintain schedule control.

Different authors have given different definitions to the concepts of planning and scheduling. Planning has been regarded as the process of thinking and developing a plan to achieve a given end, and defining various parts of the plan and their logical relationships.

According to James O'Brien, author of the **Scheduling Handbook**, "scheduling relates to getting things done." Scheduling is the means by which all activities relate to our most precious resource, time.

A planner/scheduler is responsible for the correct translation of plans from various functional groups into a schedule, and for the calculation of durations, schedule dates, float, interdisciplinary restraints, workhours, monitoring, timely status reporting, and other related activities.

Before a project begins, it is important to develop a plan on how we intend to apply our tools and what those tools are. The plan should show all of the tools needed to manage the job. Figure 1 shows an example of a scheduling plan.

Management Summary Schedule

In figure 2, level 1 is the management summary schedule, or milestone schedule, and contains about 20 items, depending on the project. Developed in a simple time-scaled bar chart, it is updated monthly and used by top management.

Master Summary Schedule

Figure 2's level 2, the master summary schedule, expands on the management summary schedule. It is used for a more detailed reporting of progress. The number of activities depends on the size of the project. It is drawn in the arrow diagram method (ADM) or precedence diagram method (PDM). Usually, PDM is used. It is updated biweekly and is used by line management and supervisors.

Project Control Schedule

The third level of scheduling involves the project control schedule, which includes the detailed engineering procurement, construction, installation, and other functional groups. It brings all of the functions together and displays the major activities of various segments of the work. Each function displays a logical sequence of activities, the principal constraints, and the interdependence with other related functions. We can assign resources at each activity on the schedule, and the code of accounts also can be listed.

The work breakdown structure (WBS) should be used to link resources and activities. The three most important steps in CPM analysis are the integrity of logic; CPM diagram; and analysis and statusing. The level of detail and number of activities vary, depending on the type, size, and complexity of a project. As a rule-of-thumb, we should have minimum detail and maximum control. Developing a CPM schedule for a large, complex project can result in thousands of activities. For small to medium-sized projects, the schedules can be developed with 200 to 1,000 activities for better control. The

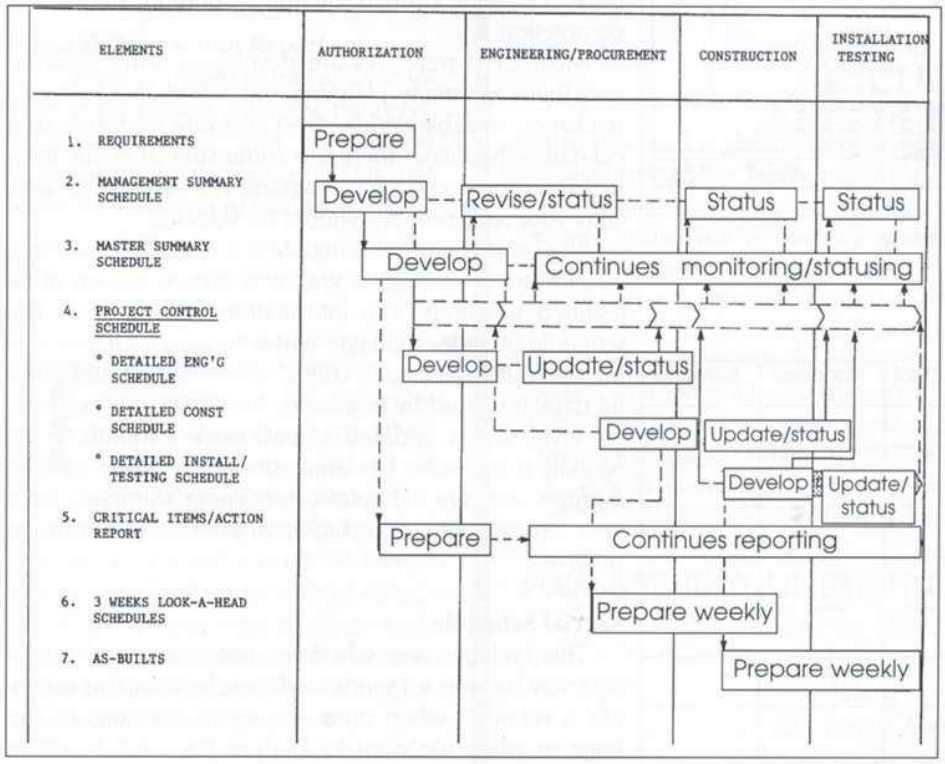

Figure 1—Scheduling Plan

Scheduling is the means by which all activities relate to our most precious resource, time

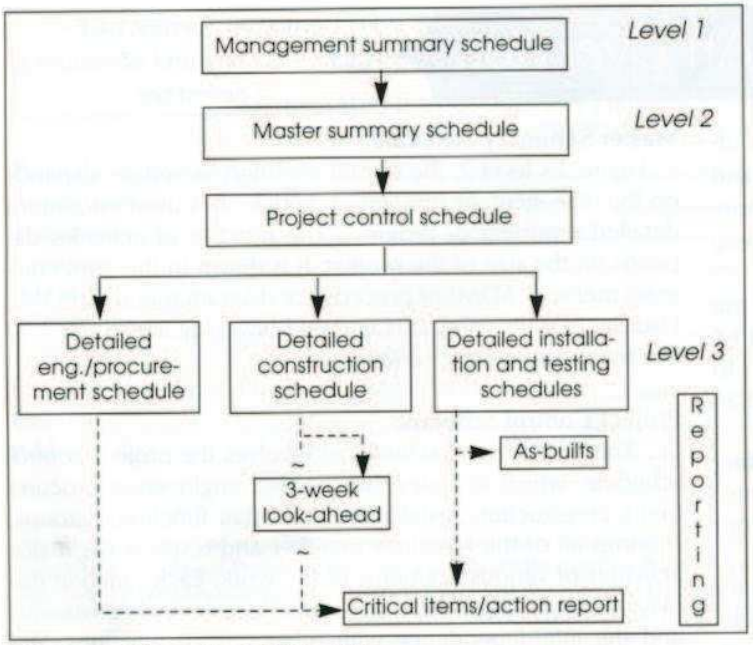

Figure 2—Hierarchy of Schedules

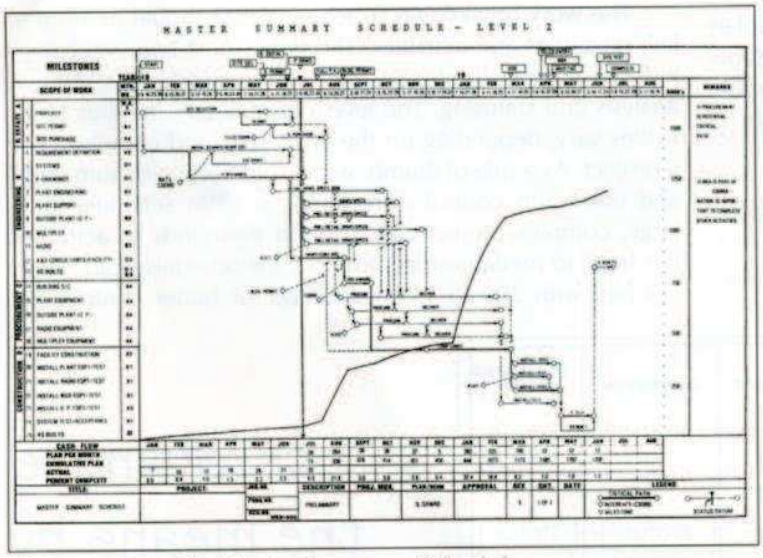

Figure 3—Sample Master Summary Schedule

Description	Scheduled	Actual	Variance	Remarks
Activities completed				
Activities in progress				
Critical items				
Potential critical items				
Other items				
Percent complete				
Action (by whom)				

Figure 5—Sample Critical Item Action Report

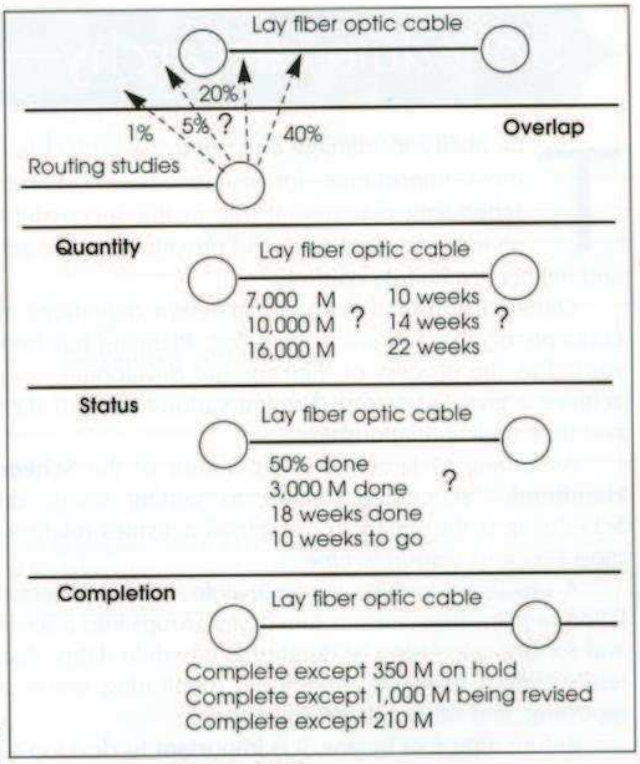

Figure 4—Activity Definition

detail schedules are in a time-scaled PDM format. To expedite the process, we can use a "generic schedule" as a guide, if one is available. The critical path should be clearly marked. Only 15 to 20 percent of the activities should be critical.

Figure 4 shows how to define an activity during the scheduling process. We need to analyze all of the aspects, including overlap, quantity, duration, status, and completion.

Most CPM networks are developed using computers. There are many planning and scheduling software packages available. While most software performs critical-path scheduling, there are some special characteristics associated with each program. The system that best suits your requirements should be selected.

The project control schedule is an excellent communication tool that gives a graphical representation of integrated functions. The information generated by the schedule provides management with workhour and production rate levels, float, critical activities, and other useful data. It is used by engineers, foremen, and the working level, and is updated at least once a month, or biweekly, if possible. Updating should be done by line number, percent complete, remaining duration, or a new forecast date (if available) for each CPM activity in progress.

Special Schedule

This includes any schedules not mentioned above and may include a 3-month rolling schedule. This schedule is required when there are major revisions to the logic or when we want to analyze the critical path in greater detail. This schedule is developed once and is

not updated. It is used by management.

Critical Item Action Report

This is a 1-page narrative description of the critical path (see figure 5). It exposes items that are behind schedule and any other problems that need the attention of management for timely action.

This article presents an overview of the hierarchy of schedules. Scheduling plans vary, and depend on each organization and project. Planning and scheduling should be considered an art, not a science! Developing and maintaining a good schedule requires input from all concerned, and the full participation of a project team greatly increases the chance of having a successful project.◆

We Need Your Code of Accounts!!

As first described in the *Technical Division Project Report* in the April 1997 issue of **Cost Engineering**, AACE International's Technical Division is implementing several initiatives to establish guidelines and recommended practices. A team led by Gregory C. Sillak will be handling two of these projects. One is to develop generic guidelines for project code of accounts and the other is to develop guidelines for EPC projects in the process industries.

A major part of the team's effort will be to gather existing code of accounts (COAs) so we can understand what the current practice is across a broad spectrum of industries. We need your help–you can provide your code of accounts–both process industry COAs and other COAs. This information will be kept confidential. AACE International Headquarters will provide a copy of the results, free-of-charge, to all participants.

PLEASE SEND YOUR EXISTING CODE OF ACCOUNTS TO:

Christian Heller–Staff Director,
Technical Operations
AACE International
209 Prairie Avenue, Suite 100
Morgantown, WV 26505 USA