

10.3 Project Planning and Scheduling

Project planning and scheduling are critical components of engineering project management, ensuring that projects are completed efficiently, within budget, and on time. The classification of projects is based on various factors, including scope, duration, funding source, and technical complexity. Projects can be categorized as public or private, infrastructure or technology-based, and short-term or long-term.

The project life cycle consists of multiple phases, including initiation, where project feasibility and objectives are defined; planning, where detailed scheduling, budgeting, and resource allocation take place; execution, where actual work is carried out and project deliverables are produced; monitoring and control, where progress is tracked and necessary adjustments are made; and closure, where final evaluations and documentation are completed.

Project scheduling involves organizing tasks and activities in a structured manner to ensure efficient progress. The bar chart, commonly known as the Gantt chart, visually represents project timelines and dependencies. The critical path method (CPM) identifies the longest sequence of dependent tasks, helping project managers determine activities that cannot be delayed. The program evaluation and review technique (PERT) is used for projects with uncertain task durations, employing probabilistic time estimates to improve scheduling accuracy.

Resource leveling and resource smoothing are techniques used to optimize resource allocation. Resource leveling ensures that resource demand does not exceed availability, while resource smoothing adjusts task distribution to maintain a consistent workload. Monitoring, evaluation, and control are essential for tracking project performance, identifying deviations, and implementing corrective actions.