Fişa suspiciunii de plagiat / Sheet of plagiarism's suspicion	Indexat la: 31/06

Opera suspicionată (OS) Suspicious work	Opera autentică (OA) Authentic work

OS	Cristian, V., Schnakovszky, C., „Industrial Project Planning", *Modelling and Optimization in the Machines Building Field (MOCM)*, No.7, Vol.1, p.136-139, 2001.
OA	Moody, H., „Project planning", In: G, Lawson, S. H. Weame, P. Lies-Smith (Eds), *Project Management for the Process Industries*, Institution of Chemical Engineers (IChemE), p.200-228, 1999.

Incidența minimă a suspiciunii / Minimum incidence of suspicion	
p.136:11 – p.137:12	p.200:9 – p.201:20
p.138:Figure 2	p.225: Figure 16:27

Fişa întocmită pentru includerea suspiciunii în Indexul Operelor Plagiate în România de la www.plagiate.ro

Project planning

Harry Moody

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The success or failure of a project is usually judged by whether it achieves specific objectives in time, cost and performance. Project time-scales are always being squeezed by management and there is rarely enough time to complete project work, so it is important to make the best possible use of the available time. Project objectives are achieved by co-ordinating the efforts of a range of people who invariably have different levels of knowledge and experience.

The purpose of planning

The purpose of planning is to manage the future utilization of time and resources on a project. Remember that because of the nature of project work, changes to the plan are almost certainly going to occur at some stage. Therefore, the procedures used for planning must be chosen carefully to ensure that the plan can be updated quickly, so that it remains a realistic guide to the most efficient way of completing the project and achieving the objectives.

Small projects involving no more than familiar activities may be planned simply, but the plan should be agreed to avoid the risk of failing to meet start and completion dates for key activities. More complex projects involving a diversity of people and organizations necessitate formal procedures and systems for planning.

Effective planning entails:

- setting out a desirable course of events to achieve specific objectives;
- establishing the prerequisites (such as obtaining information, materials, contractors) for the chosen course to be realized;
- considering how to deal with foreseeable happenings that will change the initial chosen plan.

Why plan?

There are many reasons including:

- project management entails interaction between people and therefore needs a disciplined approach if objectives and targets are to be achieved;

- the complexities involved in a typical project mean that no one person can have a full working knowledge of every activity required to be undertaken, and therefore some means of sorting out interrelationships, priorities and so on is needed;
- if meaningful targets are set, actual performance can be measured and corrective action taken if performance is not satisfactory.
- productivity can be improved by setting tighter targets/exploring new methods of working;
- 'fire-fighting' and 'crisis management' should be avoided.

Objectives of effective project planning

The principal objectives of project planning are to:

- provide a means of expressing complex projects in a logical sequence of activities;
- provide an estimate of the time and effort involved in each of the activities which constitute a plan;
- identify the risks involved and make allowances to cover uncertainties;
- improve co-ordination and communication;
- determine priorities;
- reduce project duration and improve time control;
- make better use of resources;
- provide better and more timely data for decision-making;
- provide a means of ensuring performance takes place in line with plans.

Some benefits of effective project planning

Effective project planning gives the following benefits:

- improved definition of work to be carried out;
- better work schedules based on knowledge of resources required and resources available;
- identification of the best way of applying resources to achieve project objectives and conform with operating policies;
- establishment of more realistic budgets for performing the work;
- ability to monitor progress and detect those points where delays will jeopardize the attainment of the project objectives in time to permit corrective action to be taken;
- more realistic prediction of final project costs and completion date;
- alternative strategies can be explored;
- the need for contingency planning is highlighted.

Project planning strategy

The planning of a project commences when deciding the project strategy, as discussed in Chapter 3. Some of the key points include:

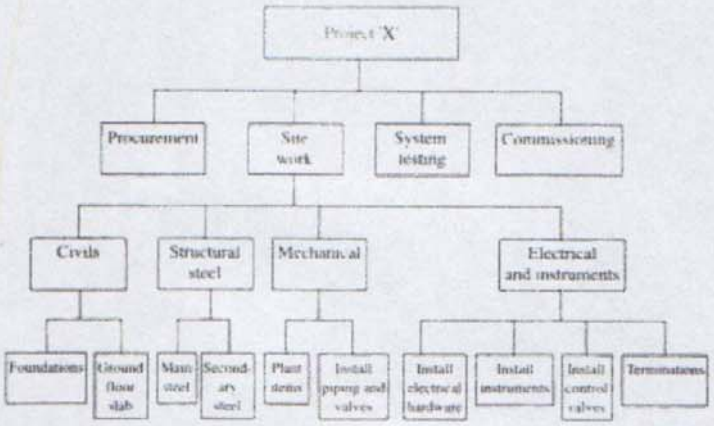


Figure 16.26 WBS for Project 'X'

Application of WBS to case study – Project 'X'

Figure 16.26 shows the embryonic work breakdown. The level of detail depends on:

- the current state of knowledge relating to the project;
- identification of 'mini-project' managers/supervisors;
- the organizational structure;
- the extent to which the work is proceduralized.

Every effort should be made at this stage to put some detail against each of the principal work hierarchical sub-divisions. For example, under the heading 'Procurement' there could be a breakdown relating to plant items, piping materials, electrical materials and instruments.

On most projects it is advisable to include a general heading of 'Project management' and break it down into work packages involving planning, costing, contractor liaison, performance reviews, reporting and so on. Each package requires effort and therefore the man-hours have to be included in the total man-hour budget.

The level one precedence diagram can now be prepared using the work packages from Figure 16.26. The work packages are taken from the WBS at the maximum level of detail:

- appointing contractor(s);
- plant item design;

- rack piping design;
- branch piping design;
- design for bobbin pieces;
- electrical hardware design;
- main steel design;
- modifications to existing items;
- casting ground floor slab;
- etc.

Resource levelling

The availability of resources is an integral factor in formulating plans and establishing work schedules.

The first step in analysing resource requirements is to estimate the man-hours for activities/work packages. Figure 16.27 shows the outline procedure. Evolving and using meaningful 'norms of performance' is an essential element of effective resource planning. Norms can be derived from detailed analysis of time sheets — provided personnel book to the job number, work package number and the key task being undertaken.

The second step in resource analysis is to consider the total demand for key resources. The definition of key resources is likely to differ for different types of project. In particular, consider those resources which are scarce and/or costly to employ.

When considering the project as a whole, there will be competition between activities and the demand may either exceed the planned availability of resources or produce a fluctuating pattern for their use. Float is used to adjust the timing of activities so that the resource imposed limits are not exceeded. In some cases it will not be possible to satisfy both these restraints and the previously calculated completion date – the duration of the project is then extended.

It is clear that the adjustment, or levelling, of one resource will have an effect on the usage of others. Generally resource levelling is only applied to a few key resources. The use of an appropriate computer program can allow a greater degree of sophistication.

Once the key resources have been adjusted a new completion date results. If this is not acceptable, the resource limits must be adjusted and the process repeated.

When resource levelling has produced a satisfactory solution, the start and finish dates for each activity are said to be at their 'scheduled' values. It is probable that only a few scheduled activities will have residual float — that is, most activities will now be critical.

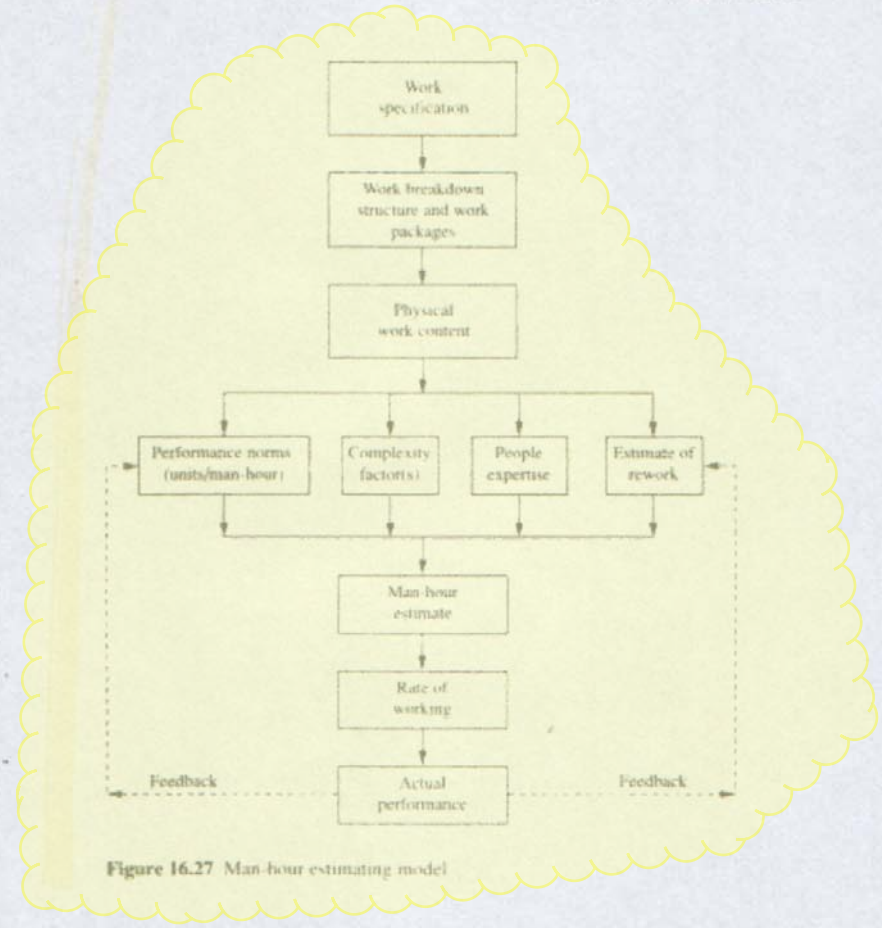


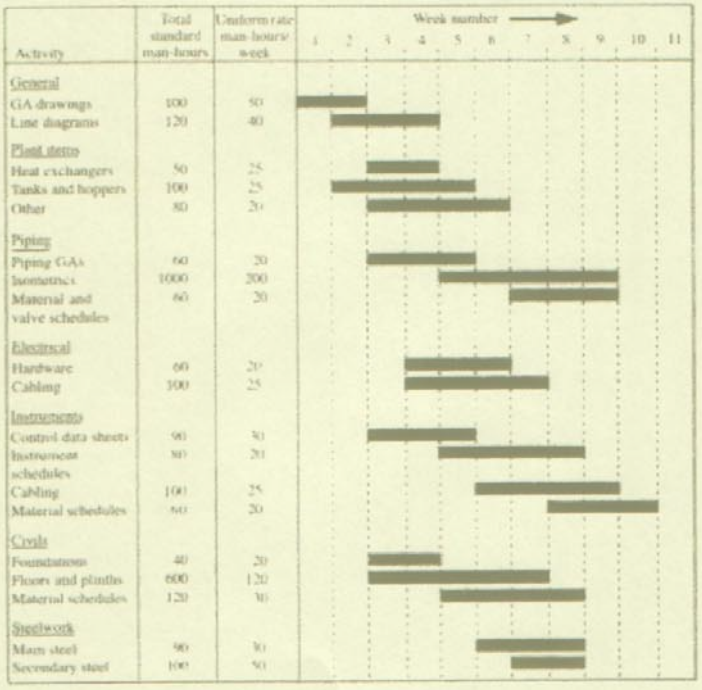
Figure 16.27 Man-hour estimating model

Resource scheduling techniques

The technique for retaining the project completion date and identifying the minimum level of resource requirement possible is demonstrated using the design work package for Project 'X'. It is assumed that the design work will be carried out by general purpose draughtspersons.

Figure 16.28 (page 226) shows the initial plan for the design work in bar chart format. All activities are on their earliest starts. The entries under the heading 'Total standard man-hours' have been derived from assessing the total quantity of work to be carried out and dividing by the appropriate norm of

Activity	Total standard man-hours	Uniform rate man-hours/ week
General		
GA drawings	100	50
Line diagrams	120	40
Plant items		
Heat exchangers	50	25
Tanks and hoppers	100	25
Other	80	20
Piping		
Piping GAs	60	20
Isometrics	1000	200
Material and valve schedules	60	20
Electrical		
Hardware	60	20
Cabling	100	25
Instruments		
Control data sheets	90	30
Instrument schedules	80	20
Cabling	100	25
Material schedules	60	20
Civils		
Foundations	40	20
Floors and plinths	600	120
Material schedules	120	30
Steelwork		
Main steel	90	30
Secondary steel	100	50



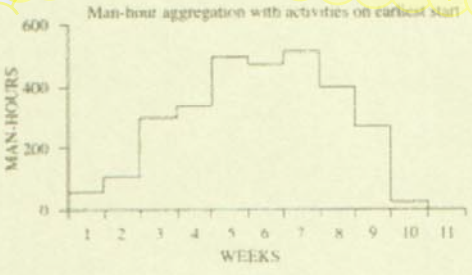


Figure 16.29 Resource levelling with activities on scheduled starts

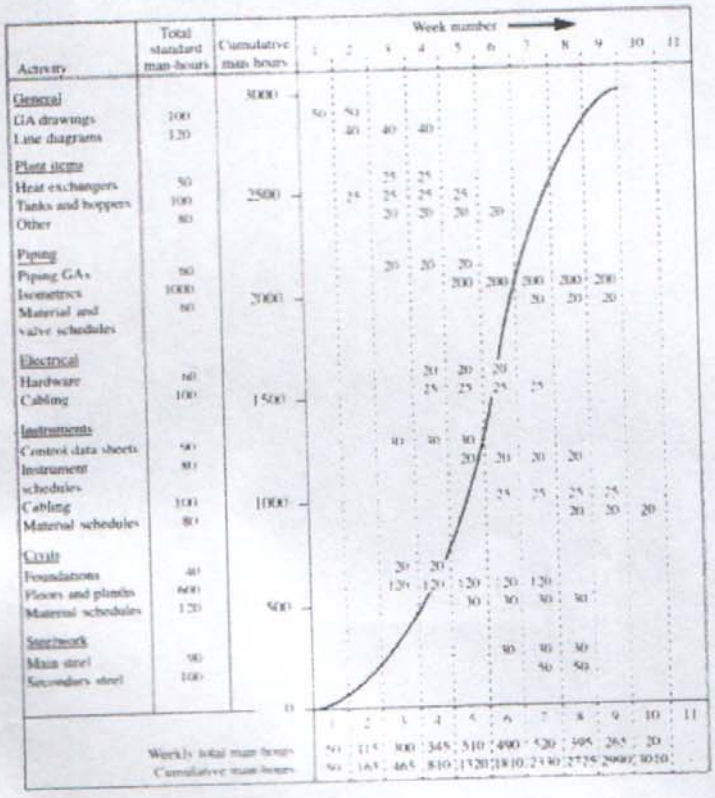


Figure 16.30 S-curve of cumulative man-hours