

# Time Management in Engineering Consulting Firms

Nasreddin Elmezaini, Ph.D., P.Eng

Assoc. Professor, the Islamic University of Gaza

**Abstract**— Human resources and manpower are the main assets for engineering consulting firms. The success of the firm depends on how well the managers can make use of their employee’s time. To maximize profit, it is necessary to maximize utilization and billability rate of the employees. Lack of work in the firm will leave some employees with an inadequate amount of work, hence, their utilization and billability rates drop and the company starts to lose cash. Sometimes however, billability rates drop not due to the lack of work, but due to the inefficient utilization of the existing manpower. This usually results from poor managerial practice and/or lack of efficiency of the employees. This paper discusses the efficiency and productivity of practicing engineers in consulting engineering firms. How can we maximize the efficiency of practicing engineers in our firms? The use of time sheet system will be demonstrated. How can we benefit from the time sheet to maximize production and minimize overhead.

**Index Terms**—Time Sheets, Consulting Firms, Chargeable time, Flexitime schedule.

## I. INTRODUCTION

"Time is Money" was first coined by Benjamin Franklin, referring the notion that time is a valuable asset, and that money is wasted when a person's time is not used productively and efficiently. (Quote investigator 2010). This statement is virtually valid for all types of business but particularly accurate for engineering consulting firms.



to

amount of work, hence, their utilization and billability rates drop and the company starts to lose cash. Sometimes, however, billability rates drop not due to lack of work, but due to inefficient utilization of the existing manpower. This usually results from poor managerial practice and/or lack of efficiency of the employees.

In the traditional working system, employees usually spend about 8 hours a day in the office. They sign-in in the morning and sign-out in the evening. The amount of work produced in this period of time depends on the efficiency and loyalty of the employee. At the end of the day, all employees will be paid for their time in the office irrelevant of their productivity. Accurate judgment and/or evaluation of the employee's efficiency, will hence be subjective, and open for debate.

In engineering consulting firms, human resources and manpower are the main assets, and hence, the main source of income for the firm. A consulting firm is a business with mostly fixed costs; one hires a group of professionals, and how much profit they make depends on how well they make use of their time on client work. To maximize profit, it is necessary to maximize utilization and billability rates of the employees. (Billability rate = ratio of chargeable time to the total working time). In other words, a consulting firm will be losing cash in any of the following situations:

- a- When there is no sufficient jobs/projects for the available staff; or
- b- When utilization or billing rates of the staff is not cost effective.

Lack of sufficient work could be the result of poor marketing or due to a slow economy. In any case, lack of work will leave some employees with an inadequate

The modern working system, which is widely used these days in most international companies, is based on a flexible working hour system using the time sheet forms. In this system, all employees need to fill out a daily report specifying the number of hours spent on each job or project. This system is not only about reporting working hours; it is actually a complete management system for the consulting firms. This article is devoted to presenting the time sheet and the flexible time system used for consulting engineering firms.

The main source of information presented in this article is based on the author's experience gained during his work for over 20 years with international companies in Canada, USA and in the Middle East.

The motivation to write this article came from the fact that most local consulting companies in the Middle East are still following the old traditional system which is believed to be inefficient.

This article is aimed to help local consulting firms and practicing engineers to upgrade their working system to international standards.

## II. FLEXIBLE TIME SYSTEM

Alternative work schedule, such as flexitime and compress time workweeks, have been adopted by an increasing number of organizations over the past several decades. Organizations have also begun introducing flexibility measures to increase the responsiveness of their products and services to market needs (Eldridge & Nisar, 2011).

In the flexible time system, employees are given some choice over the actual time they work on their contracted hours (Hill et al., 2001). Most flexible working hours schemes have a period during the day when employees must be present. This is known as "**core time**". A typical core time would be 10:00 a.m. to 4:00 p.m. Other than the core time, employees may choose when they start and finish work within flexible bands at the beginning and at the end of each day. These bands are typically 08:00–10:00 and 16:00–18:00, (Al-Rajudi, 2012). By the end of the week, each employee will need to report how he/she spent his/her contracted hours using the "**time sheet**". (Contracted hours usually range between 38-42 hours/week).

Several researchers have investigated the impact of a flexible time schedule in comparison with the traditional working schedule. Baltés et al, (1999) studied the effect of flexible and compressed workweek schedules on work-related criteria (productivity, performance, job satisfaction and absenteeism). K.M. Shockley & T.D. Allen (2007), studied the relationship between flexible work arrangements availability and work–family conflicts. They found that family responsibility significantly moderated these relationships. Russell et al. (2007) investigated the relationship between different flexible working arrangements; flexi-time, part-time and working from home, against two key employee outcomes: work pressure and work-life conflict.

Barry A.T. Brown (2001), investigated the use and representations of flexible time sheet system in a large British oil company.

Most previous researches indicated that a flexible time system helps both the employer and the employee in several ways. The following points summarize the benefits of the flexible time system that were addressed by several researchers.

Flexible time system:

- Increases performance and productivity.
- Decreases administration work loads.
- Increases employees job satisfaction,
- Increases organizational commitment;
- Increase responsiveness to market needs;
- Increases applicant attraction to an organizations offering flexitime.

## III. TIME SHEETS (TS)

Time sheets, also known as time tracking forms, are used in engineering consulting firms for tracking the time spent by each employee in each job.

Usually, a practicing engineer is involved in more than one project at the same time. In the timesheet each engineer needs to fill out the hours he/she spent on each project every day.

The timesheet is usually submitted by the end of each week. It needs to be approved by the employer's direct supervisor. In most companies, senior professionals do not necessarily need approval for their time sheets. They just need to submit it to the accounting department so that their time can be properly charged against the projects in which they are involved.

In the past, employees used to fill out their time sheets on paper forms (hard copies). Recently, most companies switched to using time sheet software, some of which provide online access and many other capabilities. **Figure-1** shows a typical time sheet form.

Since most engineering projects involve different phases and functions/tasks, the employee will indicate, on his/her TS, the project, phase, and function numbers in which he/she spends his/her time. The use of project and phase numbers will be explained in the subsequent sections of this paper.

In addition to the actual project chargeable time, which is time spent on active projects, the employee will also report the hours he/she spent in all other activities such as professional or business development. Vacations and sickness times are also reported on the time sheet as overhead expenses which will be called as None Chargeable Time (NCT).

The target for each employee is to maximize his chargeable (or billable) time and to minimize his None Chargeable Time (NCT).

<b>CEF</b>		<b>Consulting Engineering Firm</b>		EMPLOYEE		Your name				
				<b>WEEK ENDING</b>		<b>26-May 2014</b>				
Description	PIN	PN	FN	5/20	5/21	5/22	5/23	5/24	5/25	5/26
				Sat.	Sun	Mon	Tue	Wed	Thu	Fri
Project 1	12601	50	160	4.0			3.5			
Project 2	13223	20	220	3.5		2.0			2.5	
Project 3	14103	20	320		5.5	3.5	4.0			
Professional development	2014	10	80		2.0				3.0	
Business development	2014	10	70							
Office Closed (Holiday)	2014	10	60							
Sick	2014	10	50					7.5		
NCT	2014	10	10			2.0				
<b>Hours Charged Above Certified Correct:</b>	<b>Total/day</b>			7.5	7.5	7.5	7.5	7.5	5.5	
	<b>Total/week</b>			43.0						
<b>Signature</b>	<b>Date</b> 8/7/2014			<b>For Administration Use Only</b>						

**PIN**= Project Initiation Number, **PN**=Phase Number, **FN**= Function Number

**FIGURE-1:** Typical Time sheet

**IV. BENEFITS OF THE TIMESHEET**

With the right time sheet solution, engineering consulting firms can dramatically improve their revenue. The information collected from the TS can be benefited in several ways, including:

- Assists the company to properly charge their clients for time spent of there jobs.
- Helps monitoring the budgets, and compare them to the progress of work. .
- Accurately calculate how much each project actually cost.
- Determine which project was profitable and which one was not.
- Helps to quantifiably compare and evaluate the productivity and efficiency of the employees.
- Promote self-control with employees.
- Helps project managers to scope and price projects more accurately.
- Reduces overhead and administration cost associated with managing time.

## V. HOW THE SYSTEM WORKS?

To explain how the TS system works, we need to define the following terminology:

- Project Initiation Number (PIN)
- Phase Number (PN)
- Function Number (FN)
- Chargeable Time (CT)
- None Chargeable Time (NCT).
- Business Development (BD)
- Professional Development (PD)
- Billing Rate (BR)

### A. Project Initiation Number (PIN)

When a new project is started, a unique number is assigned to the project called as Project Initiation Number (PIN). This number will be used as the reference in all aspects or correspondence related to the project. The PIN number usually consists of 5 or more digits (Example of a PIN is: 13031). The first two digits refer to the year in which the project started. The last three digits refer to the project serial number. Depending on the company size and policy, more digits may be added to include the area code to define the project zone or site location.

The PIN is assigned using a special form known as the Project Initiation form, which is usually prepared by the Project Manager. This form typically includes the following information:

- Project title and description.
- Project phases.
- Budget allocated for each phase.
- Names of the Project Manager, Project Director, and the team leaders.
- Names of the Quality Assurance team.
- Client contact details and billing information.

### B. Phase Number (PN)

During the tender stage (tender proposal), the project is usually divided into phases such as, preliminary design, detailed design, and contract administration. The Project Manager (PM) and his team, based on their experience, will estimate the number of people and the amount of work (manpower) necessary to complete the required tasks in each phase. This estimate is necessary to price the project for tender. Usually, each phase of the project is assigned a specific number of hours and an allocated a budget. The Phase Number (PN) will be used by all staff members when preparing their time sheets.

Examples of project phases:

Preliminary Design	:	Phase 10
Detailed Design	:	Phase 20
Contract administration:		Phase 50

The data collected from the Time Sheets will help projects managers to monitor the progress of work in each phase for each project. It will also assist them to control and monitor the budget.

### C. Function Number (FN)

Each phase usually includes several tasks or functions in which engineers from different departments are involved (e.g. Structural, Architectural, and electro mechanical). The amount of work for each group is also estimated, and hence, the PM will distribute the budget of the active phases between the different groups. Therefore, each function is usually given a specific number to help track the budget consumed by each group. The following is an example of the function numbers which are commonly used:

Project management	:	100
Architectural design	:	200
Structural design	:	300
Electrical design	:	400
Mechanical design	:	500

Inside each function different tasks can be assigned. For example, FN=310 refers to structural engineering time, whereas FN=320 refers to structural drafting time, and so on. The level of elaboration in this detail depends on the size of the projects and on company policy. The diagram shown in **Figure-2** shows the sequence of project phases and functions.

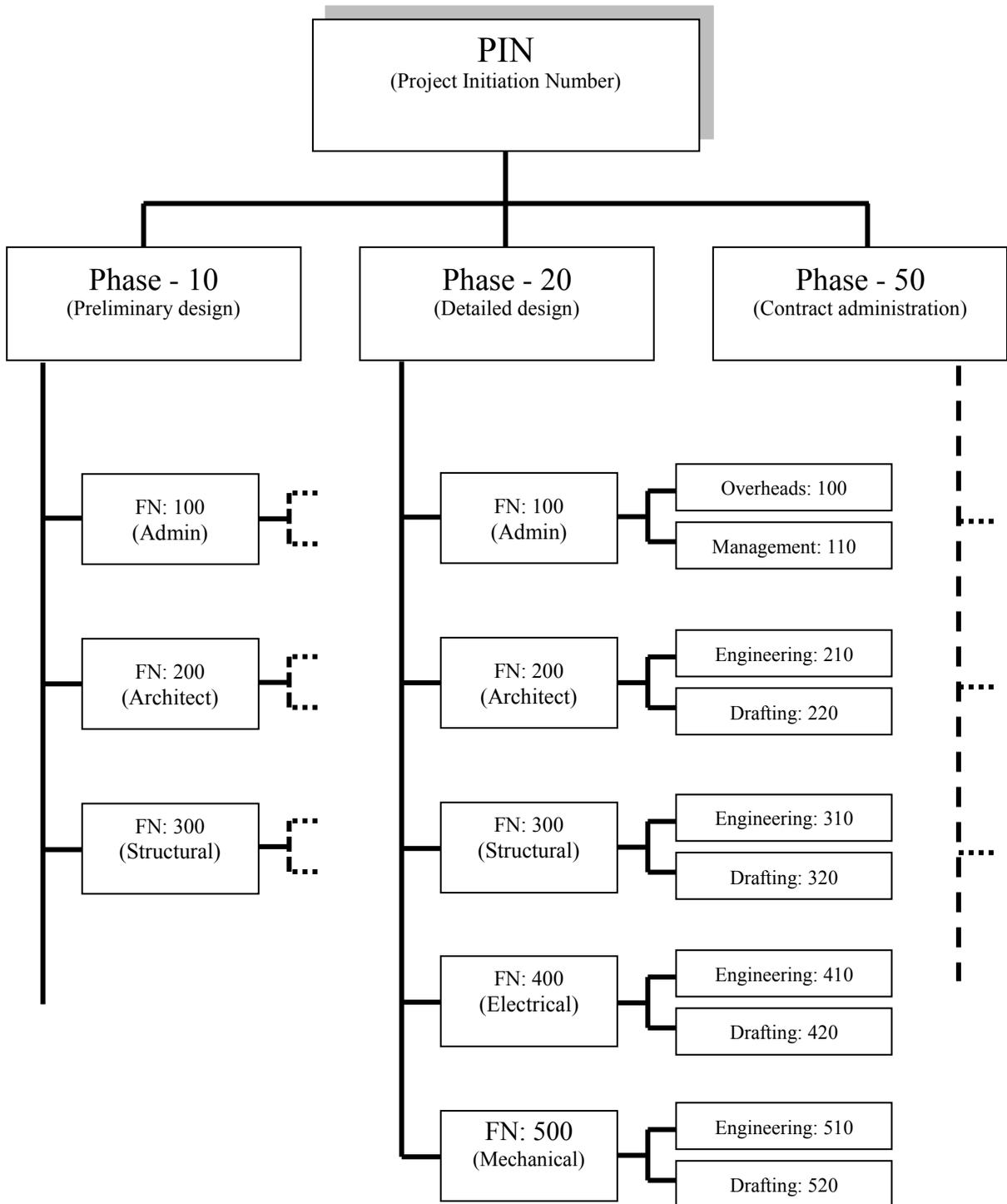


FIGURE-2: Project Phases, Functions and Tasks

#### D. Chargeable Time (CT)

Chargeable time is the actual working time spent by employees on active projects or other activities with available budget. Using the time sheet system, chargeable time can be categorized based on the phase, function and task numbers. By the end of the project, the project manager will be able to know exactly how much each discipline and each individual used from the allocated budget.

#### E. None Chargeable Time (NCT)

None Chargeable time is any time spent by the employee that cannot be charged to a project or has no available budget. This may include but not limited to the following:

- 1- Sick and vacation time.
- 2- Time spent in the office without a job in hand (doing nothing)
- 3- Time spent on a project over its allocated budget.

NCT is an overhead expense to the company that needs to be limited or minimized as much as possible.

#### F. Business Development (BD)

Business Development (BD) activities are essential for getting new projects. Companies encourage their employees, especially senior associates, to spend part of their time for business development. BD time is the time spent on proposal writing, as well as, other marketing activities such as communicating with potential clients. Although this time is considered as direct overhead for the company, yet, most companies allocate part of their budget for BD. Therefore, BD time is considered as chargeable time for the employee.

#### G. Professional Development (PD)

It is important for the company to invest in its employees by providing training to them and helping them be up-to-date on every aspect related to their profession. Attending training courses or participating in seminars, workshops, exhibitions, or conferences is considered as Professional Development (PD). Therefore, most consulting companies allocate some of their budget for PD. The employee can charge his/her PD time to this allocated budget.

#### H. Billing Rates (BR)

Billing Rates are the cost of engineering service that will be charged to the project per hour. Staff members and professional personnel have different billing rates depending on their expertise and seniority level.

BR is calculated as follows:

$$BR = \text{Basic Salary (BS)} + \text{overhead} + \text{Profit}$$

Usually **BR** is 2.0 – 3.0 times **BS**

Generally, each company submits a copy of its staff billing rates to the client along with the tender documents.

## VI. HOW THOSE NUMBERS ARE USED?

The process starts with the proposal for tender. When the **PM** prepares a tender for a specific job, he/she needs to define the following:

- Scope of the work needed for the project
- Stages and Phases included, such as :
  - Preliminary design
  - Detailed design
  - Contract administration

The **PM** also needs to indicate the total hours required to complete each function and the staff member who is going to do each of those functions or tasks. Usually, the PM discusses these issues with his engineers involved in the different disciplines. Knowing the billing rate for each staff member, the budget for each phase can be calculated.

The target for the Project Manager and his team is to meet the project deadline and to be within the allocated budget.

#### A. Performance and Efficiency:

The performance of the PM and his team is measured on the basis of how good they are in meeting the specified targets (budget and deadlines).

Usually, each employee will be assigned specific tasks to do in a given time period. Efficient, employees finish their tasks properly and on time. Others may lack the skills required to complete the assigned task efficiently. If the employee fails to finish his/her job on time, he/she could be in trouble. Efficiency of an employee can then be evaluated based on the time he/she needs to complete a job compared to the originally allocated time. Based on one's efficiency, they will be rewarded, penalized, or sent for extra training.

#### B. Efficiency Index (EI):

$$EI = \frac{\text{Chargeable Time}}{\text{Total Time}} \times 100$$

No one is expected to achieve 100% efficiency. There will always be some NCT, and overheads that can't be charged to any job. NCT also includes vacations and sick leave times.

#### C. Problems:

Problems arise when the expenses charged to the project exceeds the originally allocated budget. Typically this problem results from one or more of the following reasons:

- Lack of coordination between disciplines. (PM problem)
- Underestimating the scope of work. (PM problem)

- Inefficient staff members. (staff problem)

Reasons for not meeting the budget can be identified by examining the data collected from the time sheets. The TS will tell us how many hours each engineer spent on each task. If an engineer puts more hours than the allocated budget it means that;

- His/her budget was underestimated, or
- He/she was not efficient.

#### D. Inefficient Engineer:

If an Engineer is shown to be inefficient in most of their work, they may be given some other chances. If they cannot improve their performance; PMs may not consider them for new projects. Then they will not be able to put enough chargeable time on their TS. Accordingly their NCT ratio will increase and their efficiency will drop. They will then be given warnings. If they cannot improve themselves, they may lose their job.

#### E. Efficient Engineer:

Those who always meet the schedule and the allocated budget will be in demand for PM's. Accordingly, they will get more work and will be busy all the time, and hence, they will score a high efficiency rate. Accordingly, they will get promoted and will receive more incentives.

## VII. SUMMARY AND RECOMMENDATIONS:

The modern working system which is based on the flexible work arrangement using the time sheet format appears to have several advantages over the traditional fixed time arrangement. It helps increase productivity and promotes self-control. Time sheets help engineering consulting firms track and bill their time, as well as, quantifiably compare and evaluate their employees. It also helps the consulting firms reduce their overheads and maximize their profit. This system is recommended to be implemented in all consulting firms. Seminars and training sessions can be arranged through the Engineering Association to raise the awareness of this efficient system.

## REFERENCES:

- [1] Quote investigator (May 14, 2010), Time is Money. Benjamin Franklin? Retrieved from <http://quoteinvestigator.com/2010/05/14/time-is-money/>. (Accessed Nov 2014)
- [2] Eldridge, Derek and Nisar, Tahir M., *Employee and Organizational Impacts of Flexitime Work Arrangements*. Department des relations industrielles. Vol. 66,

No. 2, (2011).

- [3] Hill, E. J., Hawkins, A. J., Ferris, M., & Weitzman, M. *Finding an extra day a week: The positive influence of perceived job flexibility on work and family life balance*. Family Relations, 50, 49–58, (2001).
- [4] Al-Rajudi, K. and Al-Habil, W. *Impact of Flexible Work Arrangements on Workers' Productivity in Information and Communication Technology Sector: An Empirical Study of the Gaza Strip ICT Firms"* A Thesis for the Degree of Master in Business Administration, IUG, (2012).
- [5] Baltes, B.B., Briggs, T.E., Huff, J.W., Wright, J.A., Neuman, G.A.. *Flexible and compressed workweek schedules: a meta-analysis of their effects on work related criteria*. Journal of Applied Psychology 84, 496–513. (1999)
- [6] K.M. Shockley, T.D. Allen, *When flexibility helps: Another look at the availability of flexible work arrangements and work–family conflict*. Journal of Vocational Behavior 71 (2007) 479–493
- [7] Russell, Helen; O'Connell, Philip J.; McGinnity, Frances: *The impact of flexible working arrangements on work-life conflict and work pressure in Ireland*. The Economic and Social Research Institute (ESRI), Dublin, No. 189 (2007)
- [8] Barry A.T. Brown. *Unpacking a Timesheet: Formalisation and Representation. Computer Supported Cooperative Work (CSCW)*. 2001, Volume 10, Issue 3-4, pp 293-315

**Nasreddin Elmezaini, Ph.D., P.Eng.** is an Associate Professor of Civil Engineering with over 29 years of academic and professional experience. His research interests include: Finite Element Analysis, behavior of buildings under abnormal loading conditions, soil structures interactions, and repair and strengthening of buildings.

During his work at the university, he occupied several managerial positions and chaired several educational and scientific committees.

Beside his academic experience, Elmezaini was also involved in the industrial sector as a professional engineer with local and international consulting firms in Canada and in the Middle East. His professional experience covers wide variety of engineering projects.