

# FINANCIAL CONTROL IN PROJECT MANAGEMENT

by Nghi M. Nguyen

## INTRODUCTION

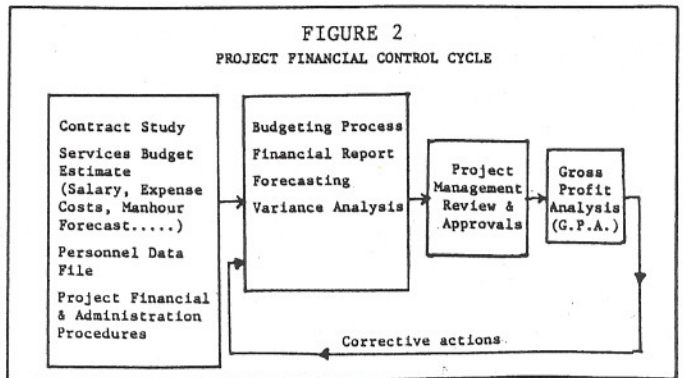
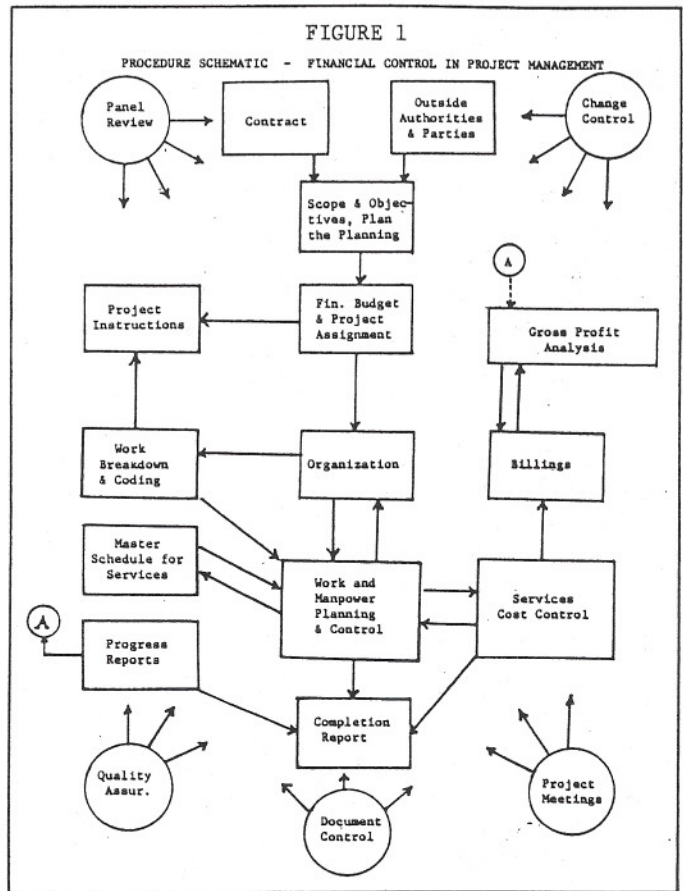
Project financial control, the planning, organizing and controlling of the financial status of a project compatible with owner's requirements, is becoming more and more important in project control disciplines as competition for engineering services increases for engineering contractors. Financial control systems are implemented in a project to keep the services costs for which a contractor is directly responsible as reasonable as possible within the contract budget and assist project management in achieving the contractual profit on a project. Financial control is required through all stages of project development for planning and controlling resources and tasks for a contractor's services.

Figure 1 shows the procedure schematic of financial control in project management. Financial control systems comprise budgeting process, cost records, forecasting process, variance analysis and corrective actions. They are mechanism to capture data from the project financial activities, analyze these data and continually forecast the financial status of the project. This status is reported to project management where appropriate decisions are made to maintain project profitability. A typical project financial control cycle is shown in Figure 2. The objectives of this paper are:

- To identify different factors involved in financial planning and control in project management
- To discuss the cost engineering process through different stages of financial planning and control in the project management team
- To examine the trend of this discipline as an effective project management-support tool.

### MAJOR FACTORS IN PROJECT FINANCIAL CONTROL

The following are major factors affecting the financial planning and control of a project:

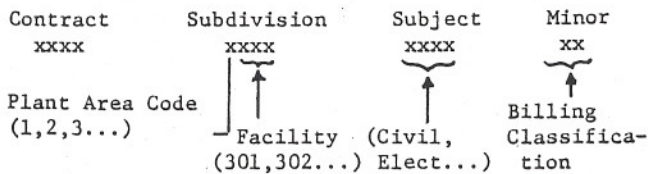


- Project contract: The contract is the most important document which stipulates the services required by the owner. It is an agreement between the engineering contractor (E/C) and its client relating to the undertakings of both parties in the project. Special attention shall be given to any request for E/C services different from those stipulated in the contract since this may completely change the financial picture of the project. Attention must also be paid to any agreements between the E/C and its sub-consultants. A copy of the contract must be distributed within the company to all corporate management staff as well as the project key personnel. The contract, therefore, defines clearly the requirement and responsibilities E/C has to follow in the proper execution of the project.
- Outside authorities and parties: Government laws, by-laws and regulation or those of other parties affecting the financial aspect of the project, e.g., insurance companies, regulatory agencies, etc.
- Scope and objectives: The scope of professional services E/C has to do, i.e. engineering, procurement, construction, project controls, commissioning or any other related services required for the satisfactory completion of the project. The objectives should indicate the relative importance of Quality/Scope, Cost and Time objectives as well as the degree of involvement of E/C in the planning, control and administration required for the project.
- Financial budget and project assignment sheet (P.A.S.): Financial budgets for professional services required must be prepared by all chiefs of disciplines involved in the project. These budgets will be reviewed by project management and consulted with the services financial controller (or cost engineer) with respect to cost records, cost trends, scope of services, etc. These discipline budgets will be reviewed by corporate management and submitted to client for approval under the total integrated budget prepared on a project assignment sheet (P.A.S.). The purpose of the P.A.S. is, therefore, to record the official opening of a project and to provide information on the project such as client, project code, description of projects, services, invoicing terms and conditions, format of cost reports required, schedule and the integrated financial budget. The financial budget on the P.A.S. is used as a yardstick for financial planning and control of project reviews, direct costs and gross profit expected. It serves as a guide for the cost engineer to plan and control actual services costs, versus planned costs. The financial budget and the P.A.S. must be revised, updated and approved as soon as a project change notice (P.C.N.) is approved. This budget is not only helping to control the project; it also serves to define the company's bookings.
- Project organization: The structure of E/C and its client project teams to fulfill their respective functions.
- Work breakdown and coding: The scope of E/C services to be broken into manageable elements of work. The cost engineer must establish codings to control the work performed by E/C.
- Project instructions: The manual detailing the responsibilities of parties involved and covering all procedures incidental to the proper performance of work.
- Work and manpower planning and control: The planning and control on the project of the Quality/Scope, Cost, Time and Manpower for E/C services. The planning and control of work and manpower is the basis for the development of E/C services budget. It shall be reviewed and updated on a monthly basis by each discipline concerned. It will enable the project cost engineer to assist project management in leveling the manpower across all divisions, per discipline, after taking project manpower requirement into consideration.
- Services cost control: This is the prerequisite for effective financial planning and control. It is the control of manhours and direct costs of E/C's professional services salaries, expenses and its sub-consultants. It consists of E/C control of its employees' time sheets and expense sheets, project services and expense costs reports, services billings and audits.
- Services billings: The billing of E/C professional services performed. The cost to be billed is governed by the condition of the contract with the client e.g. cost plus, lump sum etc. Billings are issued upon reviewing with project management by the cost engineer.
- Master schedule for E/C services: The CPM master schedule showing the start, duration, and completion of essential phases of activities. The master schedule establishes key dates for the overall strategy for the execution of the project. It is helpful for the cashflow forecast of E/C professional services.
- Progress report: The project monthly report issued by project management covering reports of all disciplines with respect to their performance to-date, their forecasted services, essential activities, Quality/Scope, planning, cost, schedule, manpower and other resources as well as their evaluations and recommendations.
- Quality assurance: The planning and control support from E/C corporate chiefs of disciplines to the project team.
- Document control: A well-organized system for the orderly day-to-day receiving, storage, retrieval and distribution of all project documents.
- Project panel review meeting: A meeting to review the status of the project, to evaluate the performance of the project team and to provide management with the input of company corporate management.

- Project meeting: The coordination project meeting which must be held with a two-week frequency to assess deviation between planned, actual, forecast to complete and indicated total in all areas of project management concern for all E/C services so that to bring deviations back on course.
- Change control: All changes of Quality/Scope, cost or time schedule not due to E/C's error or negligence are subject to the preparation of Project Change Notices (P.C.N.) PCNs are considered changes to the contract and E/C, therefore, shall determine the effect of such change on its services cost of the work.

### COST ENGINEERING PROCESS IN PROJECT FINANCIAL CONTROL

The financial planning cycle starts with a thorough study of a letter of intent or a contract signed by E/C authority and its client. All items of the contract relating to the financial aspects of the project have to be thoroughly understood and memorized, if possible, by the cost engineer. Items such as schedule, remuneration of E/C, reimbursable costs and audits, terms of payment, changes, liability of E/C, taxes, insurance, subcontracts, etc. are of utmost importance in helping to implement an effective financial planning. Cost engineering will assist project management in preparing the preliminary P.A.S., the budget summary, the salary and expense budget so as to record the official opening of the project, the characteristics of the project, the project financial budget or revisions in the company finance and accounting books. Should any budget revisions or PCNs take place, cost engineering will subsequently revise and re-issue the P.A.S. The cost engineer's responsibilities are to coordinate and analyse the services information so as to outline the procedures to be followed in setting up work breakdown and coding for services time and expense charges. These work breakdown and codings were set up based on project organization chart and the cost engineer's intention to later monitor and control the costs and manpower of professional services contracted to E/C. The following illustrates a typical coding of time charges.



As soon as the preliminary P.A.S. is approved and entered into the computerized financial system, a preliminary project financial summary (P.F.S.) is issued. Figure 3 illustrates a format for P.F.S. This P.F.S. will be analysed and monitored on a monthly basis as the project progresses. The preliminary E/C services budget is prepared based on the prerequisites such as preliminary work breakdown, packages, services,

schedule, project coding, preliminary engineering (if any), historic records of similar projects.

The definitive P.A.S. budget is the result of all discipline manpower estimated from the "second level" summary of manpower - the summary from the first level details the needs of personnel for the various categories of manpower - and this P.A.S. budget will be updated and revised as required during the life cycle of the project. Figures 4a, 4b and 5 illustrate the form used for the summary of the P.A.S. and a second level work and manpower control sheet used for manpower planning purposes. This form is also used for the refinement of the budget as it indicates in detail the number of persons each discipline required as well as the duration of their assignment determined by the work productivity required and the time constraints established by the schedule. Discipline managers shall review the second level forecast for their respective discipline with the cost engineer to help the latter to estimate their budget. It is also used for E/C manpower forecast and leveling (MFL) which receives information from this form and releases a manpower status report. A reconciliation of the project manpower status with respect to other projects being run in the E/C offices will produce an MFL project report and MFL salary forecast. Figures 6 and 7 illustrate the concepts. Cost engineering will assist, coordinate and produce the MFL information to confirm the chiefs of discipline's manpower planning and provide the latter with an equivalent MFL's salary and revenue's forecasts, advising them of their cost trends in planning their services compatible with E/C company's corporate policies.

The financial control cycle starts with the collection, checking and verification of the time sheets and expenses sheets submitted by project staff. Codings for these documents must be verified since they will be entered into the computerized service and expense cost reporting system at the end of each month as information to be monitored and reviewed by the cost engineer and presented to project management for decision-making. This timely and effective reporting and monitoring of financial data will help reducing management's decision-making time.

Information provided by the different cost reports will help the cost engineer to control the cost and manhours of the services contracted to E/C. Such a financial control will keep E/C billings to its client within budget on cost plus contract and ensuring E/C's budgeted profits on lump sum contracts.

Financial planning and control of E/C services follows strictly the control of work and manpower forecast and leveling (MFL). The degree of control will be obtained effectively if the cost engineer can have an effective general observation and forecast of the direction the project is heading. He has to supply project management with good predictive control so that the latter will not be involved with too much guesswork which can jeopardize the financial success of the project. As he practises

FIGURE 3

FPC335-036-036J-P-0000180  
MANAG.CO. 0001 SNC INC.

ACCOUNT 6552 BAIE COMEAU-SER. IV\*  
CLIENT 1344 S.C.M.R. LTD.

CURRENT MONTH	YCAF TO DATE		PROJECT TO DATE (1)	FORECAST TO COMPLETE	INDICATED TOTAL (2)	BUDGET (3) VS 2 VS 3	% OF COMPLET
		REVENUES FROM :					
		FIXED FEES					
		SALARY (A)					
		EXPENSES					
		MISCELLANEOUS					
		WRITE OFF					
		RESERVES					
		TOTAL REVENUES					
		COSTS OF :					
		SALARIES					
		- BILLABLE (B)					
		- NON BILLAB. (C)					
		- PAID OUT MARKUP					
		- TOTAL COSTS					
		EXPENSES					
		- BILLABLE					
		- NON BILLABLE					
		- PAID OUT MARKUP					
		- TOTAL COSTS					
		TOTAL COSTS					
		GROSS PROFIT (D)					
113.0 \$	119.0 \$	% G.P. / BASE SALARY: D/(B+C)	123.0 \$	111.0 \$	121.0 \$	122.0 \$	
194.00	201.00	RATIO :	202.00	195.00	202.00	203.00	
		BILLING RATE ON SALARIES: A/B					
		BILLING SUMMARY					
		RECEIPTS					
		RECEIVABLES					
		HOLDBACKS					
		FOREIGN EXCHANGE ADJUSTMENT					
		TOTAL INVOICES					
		WORK IN PROCESS (+)					
		DEFERALS (-)					
		BALANCE ON ADVANCES (-)					
		RESERVES (-)					
		TOTAL REVENUES					
REPORT DATE 84-10-31		036 PROJECT FINANCIAL SUMMARY					
PRINT DATE 84-11-08		REQUEST 0363 PAGE 1				LOC 3017	

FIGURE 4a

SNC		WORK AND MANPOWER CONTROL		CLIENT	SHEET	UPDATED	GROUP (2nd CHARACTER)	DISCIPLINE (DISC.)
		SECOND LEVEL MANPOWER SUMMARY		PROJECT			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
13	MANPOWER		17	12 MONTH FORECAST		SCHEDULE		
CONT	SUBD	ELEMENT	VA	EMP	EMP	EMP	EMP	BEYOND
ASSIGNMENT STATUS				14	15	16		
A ASSIGNED				TOTAL	SURPLUS			
S SHORTAGE					SHORTAGE			

FIGURE 4b

PROJECT 6552 BAIE COMEAU-SER. I MANPOWER STATUS REPORT AS OF 01 NOVEMBER 1984 MFL SALARY FORECAST \*\*\*\*\*

MANAGING COMP SNC INC REPORT DATE 25 OCTOBER 1984 ESCALATION = 3.0% PER YEAR  
 MANAGING DIV MINING & METALLURGY

SUBD-SUBJ-ACT	1984		1985		1985							BEYOND	TO COMPLETE	
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP			OCT
1000-4000-11	2,579	1,754	2,506	1,119	0	0	0	0	0	0	0	0	0	7,960
1000-6400-13	8,226	5,594	7,991	7,141	8,413	7,274	3,211	2,923	3,077	3,235	2,794	3,469	6,742	70,096
1000-6900-13	21,357	12,938	12,918	11,544	13,600	7,080	7,711	3,010	3,168	0	0	0	0	93,329
2000-4700-11	4,366	0	0	0	0	0	0	0	0	0	0	0	0	4,366
2000-6400-13	5,235	3,560	5,085	4,545	5,354	0	0	0	0	0	0	0	0	23,781
2000-6900-13	5,337	3,630	2,138	1,911	2,251	0	0	0	0	0	0	0	0	15,269
2000-6910-13	4,571	3,109	4,441	3,968	4,675	4,043	4,403	4,008	4,219	4,435	3,831	4,757	0	50,444
3000-4000-11	5,173	3,518	5,026	4,491	0	4,575	0	0	0	0	0	0	0	22,786
3000-6400-13	6,021	4,095	0	0	0	0	0	0	0	0	0	0	0	10,116
3000-6900-13	9,296	5,163	3,335	2,980	3,511	3,036	3,307	3,010	0	0	0	0	0	33,642
4000-4200-11	4,534	3,084	4,405	3,937	4,638	0	0	0	0	0	0	0	0	20,599
4000-4700-11	8,870	6,032	0	0	0	0	0	0	0	0	0	0	0	14,903
4000-6400-13	2,693	1,831	2,616	2,338	2,754	2,381	2,594	2,361	2,485	0	0	0	0	22,057
4000-6900-13	7,313	4,973	0	0	0	0	0	0	0	0	0	0	0	12,286
5000-4000-11	4,821	3,278	4,683	4,185	4,931	4,263	4,643	4,227	0	0	0	0	0	35,034
5000-4100-11	2,346	0	0	0	0	0	0	0	0	0	0	0	0	2,346
5000-4100-11	3,987	1,356	0	0	0	0	0	0	0	0	3,341	0	0	8,685
5000-6400-13	2,362	1,606	2,294	2,090	2,415	2,088	0	0	0	0	0	0	0	12,818
5000-6900-13	7,290	3,171	2,781	2,485	2,928	2,531	2,757	2,510	2,642	0	0	0	0	29,096
6000-4000-11	3,284	2,233	0	0	0	0	0	0	0	0	0	0	0	3,518
6000-4100-11	4,791	1,251	0	0	0	0	0	0	0	0	0	0	0	6,043
TOTALS:	753,848	415,713	399,814	307,425	315,986	196,080	176,849	145,295	127,691	90,798	65,072	72,904	90,336	3157,818

YEAR END 1169,562 MONTHS 12 3067,481

FIGURE 5

<b>SNC</b>	OUVERTURE - OPENING PROJET/PROJECT	PREPARE PAR / PREPARED BY	DOSSIER/FILE				DATE										
		VERIFIE PAR / CHECKED BY	DIR/CO	COMPTE ACCOUNT	SUBD SUBD	SUJET SUBJECT	A.Y. - M.M. - J.D										
CONDITIONS DE FACTURATION — BILLING CONDITIONS							PAGE										
A) DESCRIPTION:																	
B) CODIFICATION (COMPLÉTER AVEC L'AIDE DES S.F./COMPLETE WITH F.S. SUPPORT)																	
A	GROUP/GRUPE	CLASSE/CLASS	PROJ/PROJ	DE MERE/CHILD CO	EMPLOYEES/EMPLOYER	SUBD/SUBD	SUJET/SUBJECT	MI	CAT CAT	DATE DEFFET/EFFECTIVE DATE	GRUPE GROUP	DEVISE CURR	HORAIRE PER HOUR		COUT MAJORE COST PLUS		DESCRIPTION
													Taux RATE	FACTEUR-MULTIP	H HRS	FACTEUR MULTIP	
DEMANDES DE RAPPORT / REPORT REQUESTS (REMPLIR AVEC L'AIDE DES S.F. COMPLETE WITH F.S. SUPPORT)																	
A	REPORT/REQUÊTE	DESTINATAIRE USER	NO	NO	NO	NO	SPECIFICATIONS (3)		L	GUIDE DE TRAVAIL — WORKING GUIDE							
	Registres des heures et dépenses de financements (financing hours and expenses registers)	0,4,1	N.A.	Director Manager	C,D,E,F,I,K	S/T par K et E - S/T by K and E	*	(1)		Ou encore/Also available 042: Heures seulement/Hours only 044: Salaires seulement/Salaries only 045: Coût total/Total cost 046: Revenus/Revenues							
	Estimes/Estimates (B)	0,0,3	N.A.		I,F,C,D,E,I	S/T per E, F et I - S/T by E, F and I	*			Salaires/Salaries; Dépenses/Expenses;							
	État de compte Client Statement (B)	0,4,0	N.A.					(2)		Indiquer le Im, Ex., ICD, E, etc. Indicate the printing sort: Ex: M, FCDE, etc Principales initials/sort: C: Subdivision D: Sujet/Subject E: Mineur/Minor F: Catégorie (y) I: Codes fact et non fact./Bill and non-bill codes K: Cie mère/Home company M: Cie d'origine/Source Company							
	Sommaire financier/Financial Summary (A)	0,3,6	N.A.	Director Manager						Préciser si nécessaire/Specify if necessary: a) Sous-totaux désirés/Sub-totals required b) Rapport pour une subdivision, un sujet, etc. particulier/Report for a specific subdivision, subject, etc. c) Devise particulière/Special currency, etc							
	Heures & coût-salaires/Salary hours & cost (A)	0,4,3															
	Coût des dépenses/Expenses Cost (A)	0,4,4															

Report requests completed by project (1) Demandes remplies par le projet Report requests completed by billing (2) Demandes remplies par la facturation Report requests completed by billing

LANGUE/LANGUAGE: 1 - ENGLISH 2 - FRANÇAIS

FIGURE 6

	<b>OUVERTURE - OPENING PROJET/PROJECT</b>		A TO <b>DISTRIBUTION STANDARD STANDARD DISTRIBUTION</b>		DOSSIER/FILE				DATE	
	DE FROM		CIE CO	COMPTE ADJOURNI (S.F./F.S.)	SUBO SUBO	SUJET SUBJECT	A/Y - M/M - J/D			
N.B.: LES SECTIONS -S.F.- SERONT REMPLIES PAR LES SERVICES FINANCIERS "F.S." AREAS WILL BE COMPLETED BY FINANCIAL SERVICES										
S.F./F.S.										
CLIENT:	<input type="checkbox"/>	NOM USUEL / COMMON NAME		<input type="text"/>						<input type="text"/>
		RAISON SOCIALE / SOCIAL NAME		<input type="text"/>						<input type="text"/>
		ADRESSE / ADDRESS		<input type="text"/>						<input type="text"/>
		VILLE-CODE POSTAL / CITY-POSTAL CODE		<input type="text"/>						<input type="text"/>
		PAYS - PROV. / COUNTRY - PROV		<input type="text"/>						<input type="text"/>
PROJET:	<input type="checkbox"/>	CIE GERANTE/MANAGING CO		<input type="text"/>						<input type="text"/>
		NOM DU PROJET / PROJECT NAME		<input type="text"/>						<input type="text"/>
		LIEU DU PROJET / PROJECT LOCATION		<input type="text"/>						<input type="text"/>
		DIV - BUR RESP MANG DIV - OFFICE		<input type="text"/>						<input type="text"/>
		NOM DU DIRECTEUR / MANAGER NAME		<input type="text"/>						<input type="text"/>
		N° DE REF DU CLIENT / CLIENT REF. NO		<input type="text"/>						<input type="text"/>
		DESC. DE FACTURE / INVOICE REF.		<input type="text"/>						<input type="text"/>
REVENUS DE/REVENUES FROM:			BUDGET			DESCRIPTION ETENDUE DU TRAVAIL ETC DESCRIPTION / SCOPE OF WORK ETC				
HONORAIRES FIXES/FIXED FEES			<input type="text"/>			<input type="text"/>				
SALAIRES/SALARY			<input type="text"/>			<input type="text"/>				
DEPENSES/EXPENSES			<input type="text"/>			<input type="text"/>				
DIVERS/MISC			<input type="text"/>			<input type="text"/>				
RADIATIONS/WRITE-OFF			S.O. - N/A			COUT EN CAPITAL / CAPITAL COST				
RESERVES/RESERVES			<input type="text"/>			DUREE - DURATION				
TOTAL			<input type="text"/>			DU FROM				
COUT DES SALAIRES/SALARY COST			<input type="text"/>			AU TO				
FACTURABLES/BILLABLE (A)			<input type="text"/>			A COUT MAJORE AVEC MAXIMUM? IS IT A "COST-PLUS WITH A MAXIMUM"?				
NON FACT./NON-BILL (B)			<input type="text"/>			NON <input type="checkbox"/> OUI <input type="checkbox"/>				
MARGE PAYEE/PAID-OUT MARK-UP (C)			<input type="text"/>			SI LA MARGE PAYEE (C) > 9/IF PAID-OUT M/U (C) > 9:				
TOTAL			<input type="text"/>			PROFIT BRUT / GROSS PROFIT (D)				
COUT DES DEPENSES/EXPENSES COST			<input type="text"/>			PLUS - PORTION DE (C) PAYEE AU GROUPE SNC				
FACTURABLES/BILLABLE			<input type="text"/>			PORTION OF (C) PAID WITHIN THE SNC GROUP (E)				
NON FACT./NON-BILL			<input type="text"/>			PROFIT BRUT DU GROUPE SNC				
MARGE PAYEE/PAID-OUT MARK-UP			<input type="text"/>			SNC GROUP GROSS PROFIT (F)				
TOTAL			<input type="text"/>			% P.B. DU GROUPE/SAL				
PROFIT BRUT/GROSS PROFIT (D)			<input type="text"/>			(F) + (A) - (B) %				
% P.B./SAL - % G.P./SAL (D) + (A) - (B) %			<input type="text"/>			PROFIT BRUT SELON L'OFFRE DE SERVICE / GROSS PROFIT PER PROPOSAL				
AUTORISATIONS/AUTHORIZATIONS (SELON LES DIRECTIVES OFFICIELLES-PER OFFICIAL INSTRUCTIONS)			<input type="text"/>			N° DE L'OFFRE DE SERV. PROPOSAL NO				
DIRECTEUR/MANAGER			<input type="text"/>			COMMENTAIRES - COMMENTS				
S.F./F.S.			<input type="text"/>			S.F./F.S.				

FIGURE 7

PROJECT 6552 BAIE COMEAU-SER. I MANPOWER STATUS REPORT AS OF 01 NOVEMBER 1984										MFL PROJECT REPORT *****							
MANAGING COMP SNC INC										REPORT DATE 23 OCTOBER 1984							
MANAGING DIV MINING & METALLURGY																	
SURD-SUBJ-ACT EMPL NAME		GROUP DISCIPLINE		LOCAL	1984 NOV	1984 DEC	1985 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	1985 OCT	BEYOND --
5000-6900-13																	
4412		CNSU CM CONSTRUCTION MGMT		26	100	0	0	0	0	0	0	0	0	0	0	0	0
3599		CNEM CT CONSTRUCTION MGMT		26	100	100	100	100	100	100	100	100	100	0	0	0	0
4432		CNEM SV CONSTRUCTION MGMT		26	100	100	0	0	0	0	0	0	0	0	0	0	0
6000-4000-11																	
3672		MECH IS MECHANICAL		03	100	100	0	0	0	0	0	0	0	0	0	0	0
6000-41EN-11																	
3354		CIVI ON CIVIL		10	20	0	0	0	0	0	0	0	0	0	0	0	0
4044		ENVI IN ALL OTHERS		10	20	0	0	0	0	0	0	0	0	0	0	0	0
3767		ENVI IN ALL OTHERS		10	100	90	0	0	0	0	0	0	0	0	0	0	0
TOTAL REQUIREMENTS				244	201	137	118	102	75	63	56	46	27	23	20	23	0
TOTAL SHORTAGES				11	9	9	9	8	4	3	1	1	1	0	0	0	0

predictive control and forecast, the cost engineer will have to forecast monthly "man-hours-to-complete", "expense-to-complete" for budgeted disciplines using the MFL detail sheets. The manhour forecast is systematically converted into salary forecast and is incorporated in the services cost reports. These must be assessed for any deviations so that corrective action is taken by project management if necessary. These cost reports also can be used to monitor against the services billings. Variances must be monitored closely to keep project costs within the budget. For this purpose, the salary costs-to-date as calculated from the time sheets and the estimated salaries-to-complete the project are forecasted. The latter is obtained from the MFL information. The total of these two costs minus the budgeted salary costs will give the variance. Information on these financial control-related procedures will be summarized and printed in the project financial summary and issued to the cost engineer to review with project management. Corrective actions, if required, must be recommended to project management in order to maintain budgeted contractual profit as set up during the planning phase.

The cost reports produced as a result of the financial planning and control phases of the project will be audited to make sure that the contract clauses are followed satisfactorily with respect to all financial aspects of the job. The final result of the process is the final project financial summary in which all financial aspects of the job are finalized.

In order to visualize the financial performance of E/C, financial ratios have been developed. They constitute effective indicators for the analysis of financial performance. The following are typical important factors to be considered for the project:

% Gross Profit/Base Salary

% Billing-rate/Base Reimbursable Salary Costs

Other ratios which help the cost engineer to have a good understanding of where the project is heading financially to are:

\* Project Break Even Mark-Up (A/B)

$$\frac{\text{Base salary cost} + \text{fringe benefits} + \text{project N.R.'s} + \text{occupancy costs}}{\text{Base reimbursable salary costs}}$$

\* Average Mark-Up:  $\frac{\text{Net fees} - \text{N.R.'s}}{\text{Base reimbursable salary costs}}$  (C/B)

\* Reimbursable manhours required to break-even:

$$\frac{A}{D} = \frac{\text{Total E/C costs}}{\text{Net fees per reimbursable manhour}}$$

\* Number of days of revenues (including reimbursable expenses) in receivables outstanding (Excluding holdbacks)

$$\frac{E}{F} = \frac{\text{Outstanding receivables}}{\text{Average daily revenues}} \quad \text{where}$$

$$F = \frac{\text{Total revenues}}{\text{Number of days in the period (including holidays)}}$$

\* Occupancy cost per employee

$$G = \frac{\text{Rent} + \text{taxes} + \text{electricity} + \text{equipment} + \text{Rental} + \text{telephone rental}}{\text{Total number of equivalent employees}}$$

\* Turnover

$$H = \frac{\text{Total number of employees resigned}}{\text{Total number of employees}} \times 100$$

\* Sickness

$$I = \frac{\text{Total number of mandays lost due to sickness}}{\text{Total number of mandays during period}} \times 100$$

\* Utilization factor (without N.R.'s)

$$J = \frac{\text{Total reimbursable manhours}}{\text{total manhours}} \times 100$$

\* Utilization factor (with N.R.'s)

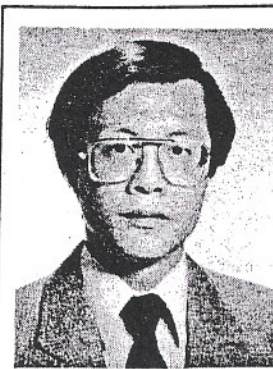
$$K = \frac{\text{Chargeable manhours (incl. N.R.'s)}}{\text{total manhours}} \times 100$$

\* "Readiness-to-serve" factor

$$L = \frac{\text{Unchargeable costs}}{\text{chargeable costs}} \times 100$$

#### TREND OF PROJECT FINANCIAL CONTROL AS AN EFFECTIVE MANAGEMENT-SUPPORT TOOL

The financial planning and control process will definitely be an integral and important part in the project management team. Financial decisions affecting project profit, which must be made by project and corporate management, will rely on the financial control expertise of the cost engineer to plan, organize and control the project's financial activities in order to achieve the project goals and objectives in accordance with owner's requirements. A combination of engineering and business management training will be of importance in attaining financial control expertise. Never before has a discipline been of such importance in the successful execution of projects. Cost engineering, a major management-support profession, must have this important role in providing project management an alternative in the decision-making process through its expertise in manpower planning, cash flow estimates, schedules, timely cost planning and control, and status forecasts resulting in meaningful and effective computerized management information systems. Thus, the growth of financial control discipline will, once again, confirm the important evolution of cost engineering profession.



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