

Chapter 3

Existing Environment

3.1 Operating Condition of the Company

A plastic parts manufacturer company, of which the information was used in this study, had two manufacturing factories in different provinces of Thailand, and a head office in Bangkok. Plastic products of the company were produced from both factories and distributed into the market by marketing & sales resources at the head office. The organization chart was shown in figure3-1.

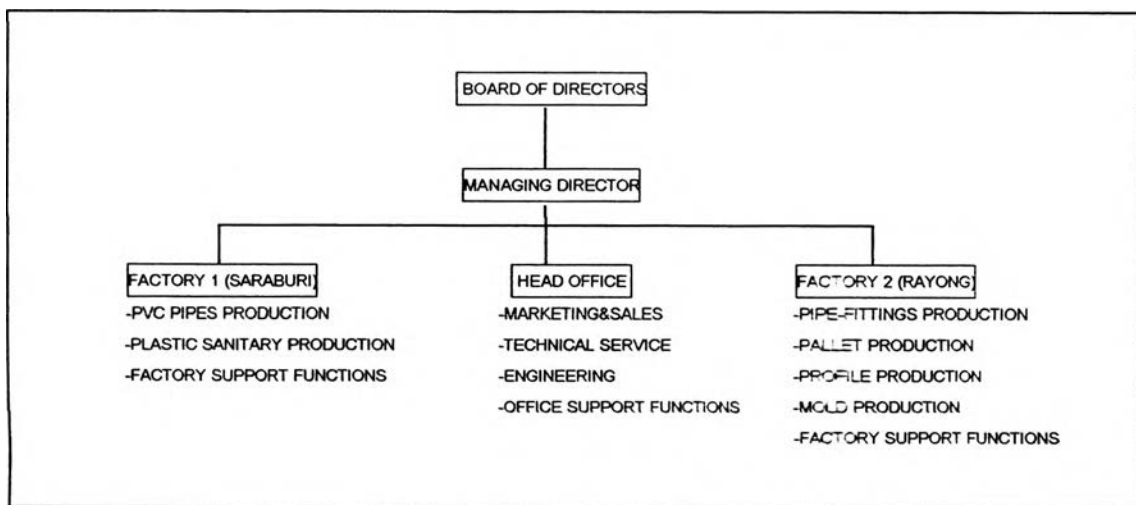


Figure 3-1 Organization Chart of the Company

The head office comprised functions of (1) marketing, (2) sales, (3) technical service, (4) engineering, (5) office administration, (6) office accounting and procurement, (7) office personnel, and (8) managing director office. The first three functions normally supported selling of plastic products. The last four functions were mainly for supporting of internal activities in the head office. And, the engineering function supported the new launched projects and R&D for both factories. But, non of these functions supported the activities of mold manufacturing. Therefore, the head office's information would be omitted from this study.

For production, each factory was managed by a plant manager and produced different types of plastic products, thus was equipped with different manufacturing facilities. First factory, located in Saraburi, was dominated by PVC extrusion technology because most of products there, were PVC pipes. However, there were some small injection facilities for plastic sanitary products, but there was no mold shop there. Therefore, this factory was irrelevant to mold manufacturing and would also be out of scope of this study.

The factory in scope of this study, located in Rayong, was dominated by plastic injection technology because most of products were injection moldings such as, PVC pipe-fittings, PE pallets, and other parts. Nevertheless, this factory also had some small extrusion facilities for PVC (door-window) profile production. Besides, this factory established a machine shop for mold making and maintenance too. Therefore, the products of this factory could be classified into 4 groups based on characteristics, namely (1) pipe-fittings and peripherals, (2) pallets, (3) profile (door-window), and (4) molds.

The estimated sales ratio of these four products were (71.56:10.09:13.76:4.59).

The organization chart of the factory was shown in figure3-2 .

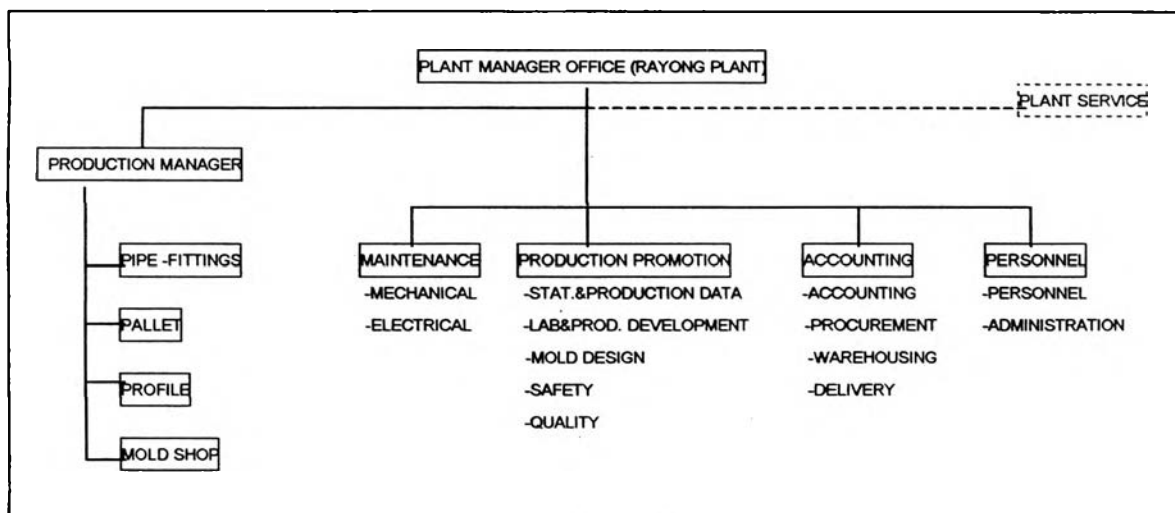


Figure 3-2 Organization Chart of the Factory (Rayong Plant)

The four product categories were produced by four production departments. Beside production, there were 4 established support departments, namely maintenance, production promotion, accounting, and personnel. Within each support departments,

there were many support functions for different services as shown in figure3-2.

Different products required different levels of services. Since this study was focused on finding cost of mold manufacturing, other information out of scope such as pipe-fittings, pallet, and profile would be omitted. This study involved only the operation of mold production department and some other relevant support functions.

3.1.1 SUPPORT FUNCTIONS FOR MOLD MANUFACTURING

There were eight support functions, of which fixed costs (FC) were shown in (Table3-1), to be studied in this paper for the overhead cost (FOH) of mold manufacturing, as stated since the introduction.

(1) **Plant service** was a function that took care of general businesses of the factory such as land, road, building, canteen, office air-conditioner, building lighting, telephone, office stationary supplies, office automation facilities, and sewage system. There was no real function or staff assigned to run this function, so there was no fixed labor cost. All activities went directly to the decision of plant manager. The task, if existed, would be done by hiring the subcontractor. The cost occurred under these tasks was charged to the cost center of plant service. The significant costs in this function were fixed assets depreciation, other material/supplies, facility power, communication, and freight & handling.

(2) **Plant manager office** was a function that facilitated management of the factory. This function's cost center covered the cost of factory management, which included plant manager's salary, fuel allowance, vehicle rent, and other expenses of plant manager. The only employee worked in this function was the plant manager.

(3) **Maintenance department** consisted of maintenance staffs and a department manager, who took care of machine maintenance for the production departments. Normally, maintenance resources were used for the machines that produce fittings, pallet, and profile. Machines for mold production were serviced by subcontractor, and hardly shared the resources of this department. The major cost of this function was staff salary.

ACC. NO.	BUDGET	PLANT SERVICE		PLANT MGR. OFFICE		MAINTENANCE DEPARTMENT		STAT. & DATA		PRODUCT DEVELOPMENT		MOLD DESIGN		ACCOUNTING & PROCUREMENT		PERSONNEL & ADMIN.	
		ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN
50 0010	RAW MATERIAL USED	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0
50 0051	FUEL	7	6	5	4	0	0	0	0	0	0	0	0	0	0	0	0
50 0052	POWER	17	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0053	TOOLS & EQUIPMENT	5	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0
50 0054	STORE & SUPPLIES	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0056	FREIGHT & HANDLING	12	16	24	25	0	0	0	0	0	0	0	0	21	22	0	0
50 0057	MAINTENANCE	7	6	0	5	0	32	0	0	1	0	17	0	0	0	0	0
50 0058	OTHER MATERIAL/SUPPLIES	27	17	0	0	0	2	0	0	5	0	0	0	0	2	5	8
50 0064	TRAVEL ALLOWANCE	0	0	0	7	0	0	16	0	2	2	0	1	3	7	0	3
50 0065	COMMUNICATION	13	35	0	0	0	0	0	0	0	0	0	0	21	21	0	0
50 0066	TAXES, LICENSED, FEES	1	0	1	1	0	3	0	0	0	1	0	0	0	1	85	104
50 0067	MISCELLANEOUS	0	2	0	5	0	0	1	0	6	0	0	0	1	0	2	15
	TOTAL (1)	89	109	30	47	0	37	17	1	14	11	17	1	46	53	92	130
50 0040	DIRECT LABOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0061	INDIRECT LAB. - SALARY	0	0	73	133	183	213	96	31	61	74	50	55	161	182	40	91
51 0061	INDIRECT LAB. - SUBCONTR.	1	4	0	0	0	4	0	0	0	0	0	0	0	0	67	104
50 0062	EMPLOYEE DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	107
50 0063	EMPLOYEE WELFARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	280	299
	TOTAL (2)	1	4	73	133	183	217	96	31	61	74	50	55	161	182	405	601
	TOTAL EXPENSE (1)+(2)	90	113	103	180	183	254	113	32	75	85	67	56	207	235	497	731
50 0068	DEPRECIATION	624	720	0	0	2	1	2	2	20	20	1	0	6	6	8	8
	GRAND TOTAL	714	833	103	180	185	255	115	34	95	105	68	56	213	241	505	739

Table 3-1 Detailed fixed cost of eight support functions in Nov., 1969

(4) **Statistical and production data** was a function within the production promotion department. This function collected production data and prepared statistical information for plastic production departments. Mold manufacturing did not use this service.

However, the cost center of this function included salary of staffs and a manager of production promotion department. This manager took significant part in order receiving, capacity planning, price quotation, and supervising of mold design. These tasks consumed 30% of total working effort of this manager.

(5) **Lab and product development** was another function within the production promotion department. This function inspected and tested the qualification of plastic products. Mold manufacturing did not use this service directly, but only when the mold was tested on the injection machine of fitting department. The products injected from the mold were measured and tested by this function. The major costs of this function were staff salary, and equipment depreciation.

(6) **Mold design** was the last significant function within the production promotion department. This function mainly designed and made the drawing of molds by CAD/CAM¹ for mold manufacturing, and serviced some design tasks to other function. Normally, designer's salary was the majority of this cost center.

(7) **Accounting and procurement** took care of accounts payable and receivable, financial reports, purchasing, receiving, stocking, and delivering of every department in the factory. The major costs of this function came from staff's salary, freight & handling, and communication.

(8) **Personnel and administration** took care of personnel tasks, and factory administration. The activities of this department covered providing employee welfare, payroll, housekeeping services, security guard, factory bus, nursing service, and employee training. The major costs of this function came from employee welfare expenses, subcontractor payment, staff salary, and taxes and fees.

¹ COMPUTER AIDED DESIGN/ COMPUTER AIDED MANUFACTURING

3.1.2 MOLD SHOP DEPARTMENT

Back to the mold shop, the resources could be divided into two functions: mold manufacturing, and mold maintenance. Mold manufacturing produced the new molds both for domestic use and for sales using 5 CNC² machines, 12 manual machines, CAM³ programming, tools, and assembly facilities, while mold maintenance was a small function that repaired and took care of old molds used in production of the other three production departments, being fittings, profile, and pallet. The major part of this study concerned with mold manufacturing. Mold maintenance was considered to be a support function that serviced plastic production departments and would be omitted. Figure3-3 showed the organization of mold shop.

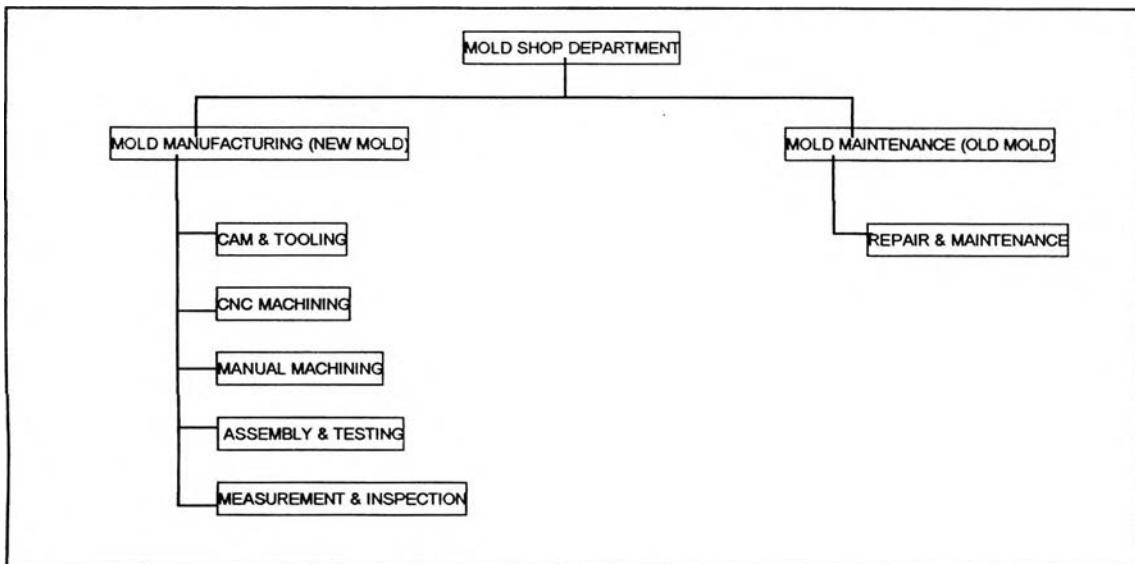


Figure 3-3 Organization Chart of Mold Shop Department

As same as other production departments, mold manufacturing department had two types of overhead cost namely fixed, and variable costs.

Fixed overhead costs (FOH-FC) of mold manufacturing, as shown as a column in Table3-2, were mainly labor salary, both direct (21men) and indirect (3men), planned-maintenance and depreciation (17machines, CAD/CAM system and know-how), which

² COMPUTER NUMERICAL CONTROL MACHINES

³ COMPUTER AIDED MANUFACTURING

ACC. NO.	BUDGET	PRODUCTION		FITTING		PALLET		DOOR		WINDOW		MOLD MANUFACTURING		MOLD MAINTENANCE	
		OFFICE													
		ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN	ACT.	PLAN
50 0010	RAW MATERIAL USED	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0051	FUEL	3	3	0	0	0	0	0	0	0	0	0	0	0	0
50 0052	POWER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0053	TOOLS & EQUIPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0054	STORE & SUPPLIES	0	0	0	0	0	0	0	0	0	0	0	5	0	0
50 0056	FREIGHT & HANDLING	18	19	0	0	0	0	0	0	0	0	0	0	0	0
50 0057	MAINTENANCE	15	4	0	0	0	0	0	0	0	0	5	13	0	0
50 0058	OTHER MATERIAL/SUPPLIES	0	2	5	0	0	0	0	0	0	0	0	0	0	0
50 0064	TRAVEL ALLOWANCE	(9)	2	0	0	0	0	0	0	0	0	1	(2)	0	0
50 0065	COMMUNICATION	1	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0066	TAXES,LICENSED,FEES	1	1	0	0	0	0	0	0	0	0	0	0	0	0
50 0067	MISCELLANEOUS	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL (1)	29	32	5	0	0	0	0	0	0	0	6	16	0	0
50 0040	DIRECT LABOR	0	0	395	467	54	49	88	113	52	0	179	233	125	101
50 0061	INDIRECT LAB.- SALARY	96	105	0	0	0	0	0	(12)	0	0	111	120	0	0
51 0061	INDIRECT LAB.- SUBCONTR.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0062	EMPLOYEE DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 0063	EMPLOYEE WELFARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL (2)	96	105	395	467	54	49	88	101	52	0	290	353	125	101
	TOTAL EXPENSE (1)+(2)	125	137	400	467	54	49	88	101	52	0	296	369	125	101
50 0068	DEPRECIATION	1	1	2,627	2,546	649	652	307	313	562	564	610	607	0	0
	GRAND TOTAL	126	138	3,027	3,013	703	701	395	414	614	564	906	976	125	101

Table 3-2 Detailed fixed cost of production departments (including mold manufacturing) in Nov.,1999

occured every month regardless of production volume.

Variable overhead costs (FOH-VC) of the department were power, tool & equipment, supplies, other materials, repair & unplanned maintenance, and etc. These costs varied between months, relative to the volume of production.

For support functions as in Table3-1. every cost was classified as fixed cost that was constant in every month regardless of any production volume. These costs were mainly staff salary, and other costs depending on the activities of each support function such as communication, other material/supplies, employee welfare, freight & handling, and etc.

According to the manufacturing environment of the factory in the case, the cost of mold manufacturing could be classified into four major groups.

- 1) Direct cost of a mold (direct material, direct expenses)
- 2) Indirect cost of a mold – from variable cost of mold department (power, supplies, etc)
- 3) Indirect cost of a mold – from fixed cost of mold department (salary, depreciation, etc)
- 4) Indirect cost of a mold – from fixed cost of support departments

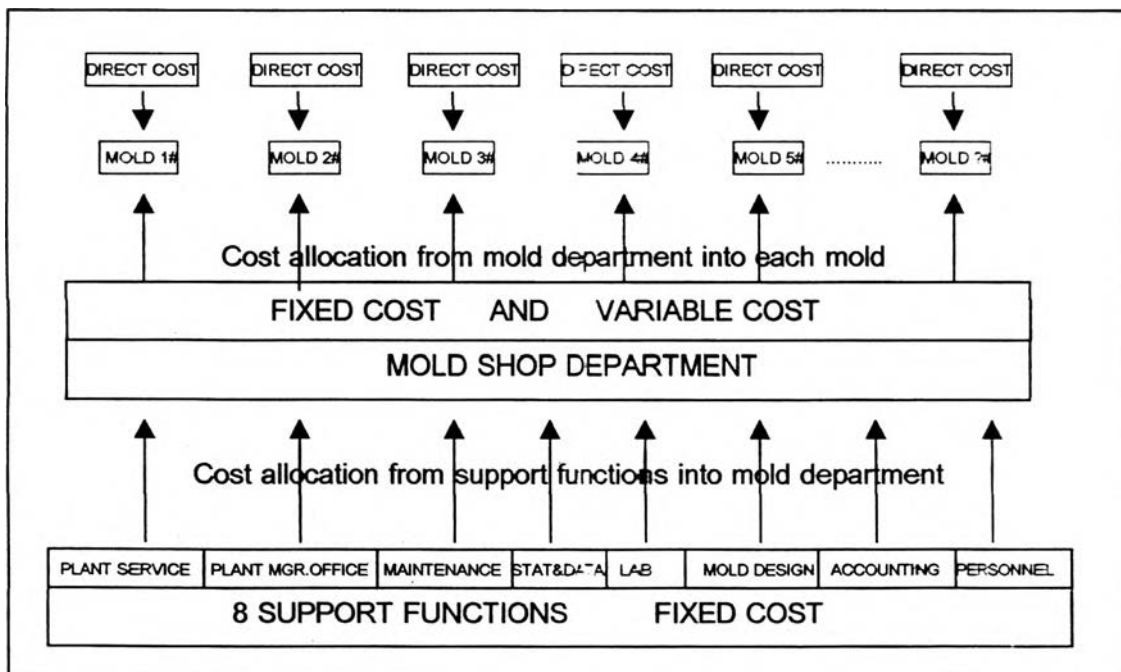


Figure 3-4 Cost Structure of a Plastic Mold

From figure3-4, three groups of indirect cost must be allocated by the proper concept to relate these overhead costs to any mold without distorting mold cost.

3.2 Information used in sample calculation of this study

To enable a realistic comparison between allocation methods, cost information of mold manufacturing in November, 1999 was used as the case in this study. Two new fitting molds namely, the mold S-18 (socket ϕ 18mm.), and the mold S-25 (socket ϕ 25mm.), were selected to be the sample for study. The main reason for selecting these two molds was about the matching of time between manufacturing schedule of the company, and the time constraint of this study. Another significant reason was about the availability of information.

Actually, these molds were already existing, but would be overhauled to improve performance. Works were not started from zero. There were some old parts already available. Therefore, work contents were not large. These two molds were manufactured, from start to finish, within November, thus data collection was convenient.

And most important, the difficulties from dealing with the information across many months could be avoided. That was good for the study because acquiring information from the factory was quite hard. The existing information system did not cover all the data needed in this study. Many data must be requested to collect in addition. If other molds were included in this study, more time would be needed to collect relating data. Then, the study would not be able to be finished in time.

Next, cost information relating mold manufacturing in November, 1999 was presented in conclusion.

VC of Mold Department	Cost in Nov. (Baht)
1.POWER COST	53,620
2.TOOL&EQUIPMENT	206
3.OTHER SUPPLIES	15,591
4.REPAIR&UNPLANNED MAINTENANCE	2,111
5.OTHER MATERIALS	5,216
6.EMPLOYEE WELFARE(safety equipment)	1,094

TABLE 3-3 Variable Cost (VC) of mold department (Nov.)

FC of Mold manufacturing	Cost in Nov. (Baht)
1.DIRECT LABOR (operator salary)	179,000
2.INDIRECT LABOR (supervisor salary)	111,000
3.MACHINE+SYSTEM DEPRECIATION	610,000
4.PLANNED MAINTENANCE	5,000

TABLE 3-4 FC of mold manufacturing (Nov.)

Support Functions	FC in Nov. (Baht)
1.PLANT SERVICE	714,000
2.PLANT MANAGER OFFICE	103,000
3.MAINTENANCE DEPARTMENT	185,000
4.STAT.&DATA	115,000
5.LAB & PRODUCT DEVELOPMENT	95,000
6.MOLD DESIGN	68,000
7.ACCOUNTING & PROCUREMENT	213,000
8.PERSONNEL & ADMINISTRATION	505,000

TABLE 3-5 Fixed cost of 8 support functions to be assigned (Nov.)

Number of new molds worked in mold shop	14 MOLDS
SUM OF Total direct cost-YTD of 14 molds	1,289,021.08 Baht
SUM OF Total raw material-month	234,956.25 Baht
SUM OF Total raw material-YTD	970,580.69 Baht
SUM OF Total raw material-(month+YTD)	1,205,536.94 Baht
Number of old molds worked in mold shop	MORE THAN 20 MOLDS
M/C WORKING HOURS AVAILABLE	4,924.5 hours
TOTAL M/C WORKING HOURS USED	2,292.94 hours
TOTAL M/C WORKING HOURS IDLED	2,631.56 hours
M/C WORKING HOURS ON NEW MOLDS	1,695 hours (≈75%)
M/C WORKING HOURS ON OLD MOLDS	597 hours (≈25%)

TABLE 3-6 Mold manufacturing information (Nov.)

TOTAL RAW MATERIAL USED	26,855 Baht
TOTAL DIRECT COST-YTD(see table3-22)	26,855 Baht
TOTAL M/C HOURS USED	173.75 hours
TOTAL DESIGN HOURS	76.5 hours

TABLE 3-7 Information of the mold S-18

TOTAL RAW MATERIAL USED	13,683.80 Baht
TOTAL DIRECT COST-YTD(see table3-22)	13,683.80 Baht
TOTAL M/C HOURS USED	45.70 hours
TOTAL DESIGN HOURS	16 hours

TABLE 3-8 Information of the mold S-25

Remarks: Total Direct Cost-YTD = (Total Raw Material Used + Other Direct Expenses)

Total Raw Material Used = Total Raw Material(month) + Total Raw Material(YTD)

ITEM	Material/Parts	Specification/Description	Quantity (kg.)	Unit Price (Baht/kg.)	Amount (Baht)
1	STEEL PLATE-CK55(S55C)	480X420X80 mm.	138.2kgx1	35.31	4,879.84
2	STEEL PLATE-CK55(S55C)	480x420X90 mm.	145.4kgx1	35.31	5,134.07
3	STEEL ROD-R17(2316)	R.65x80 mm.	2.5kgx16	192.6	7,704.00
4	STEEL ROD-R17(2316)	R.65x90 mm.	2.81kgx16	192.6	8,667.00
5	STEEL ROD-R17(2316)	R.50x30 mm.	0.49kgx16	215.07	1,677.55
6	STEEL ROD-CK45(S45C)	R.55x60 mm.	0.86kgx16	36.38	673.03
Total					28,735.49

Table 3-9 Direct material used for the mold S18

RAW MATERIAL USED	BAHT
Direct material	28,735.49
Standard parts	0
Equipment	0
Total	28,735.49

Table 3-10 Total cost of Direct raw material of mold S18

ITEM	Material/Parts	Specification/Description	Quantity (pcs)	Unit Price (Baht/piece)	Amount (Baht)
1	STEEL ROD-R17(2316)	R.85x90 mm.	8	756.00	6,048.00
2	STEEL ROD-R17(2316)	R.85x100 mm.	8	837.00	6,696.00
3	STEEL ROD-CK45(S45C)	R.55x25 mm.	8	14.88	119.00
4	STEEL ROD-CK45(S45C)	R.85x60 mm.	8	102.60	820.80
Total					13,683.80

Table 3-11 - Direct material used for the mold S25

RAW MATERIAL USED	BAHT
Direct material	13,683.80
Standard parts	0
Equipment	0
Total	13,683.80

Table 3-12 Total cost of Direct raw material of mold S25

ITEM	Expenses description	Amount(Baht)
1	Mold testing 60 min., on injection machine BKT3200	98.06
2	Mold testing 60 min., by 1 injection operator	60.00
3	Mold testing 60 min., consume 4.65kg of raw material	128.15
Total		286.21

Table 3-13 Other direct expenses of mold S18

ITEM	Expenses description	Amount(Baht)
1	Mold testing 45 min., on injection machine BKT3200	73.54
2	Mold testing 45 min., by 1 injection operator	45.00
3	Mold testing 45 min., consume 4.18kg of raw material	115.20
Total		233.74

Table 3-14 Other direct expenses of mold S25

Note: Monthly depreciation of injection machine BKT3200/2500 = 70,600 Baht

Normally, the machine runs 24 hours a day, 30 days a month.

Raw material cost is 33.56 Baht/kg, but can be recycled

Value of recycled resin is 6 Baht/kg, thus net cost of raw material for testing is 27.56 Baht/kg

Operator's labor rate is used at 60 Baht/hr.

Date	Task	Machine used	Average(Bht.) labor cost/hr.	Machining hours	Labor cost
2/11/99	drill-insert cavity bush(A) ϕ 70x80	CNC LATHE SL25	58.15	8	465.23
3/11/99	turn,face-insert cavity bush(A) ϕ 70x80	CNC LATHE SL25	58.15	16	930.45
4/11/99	turn,face-insert cavity bush(A) ϕ 70x80	CNC LATHE SL25	58.15	8	465.23
4/11/99	turn,face-insert cavity bush(B) ϕ 70x90	CNC LATHE SL25	58.15	8	465.23
5/11/99	turn,face-insert cavity bush(B) ϕ 70x90	CNC LATHE SL25	58.15	12	697.84
5/11/99	drill-lower collar ϕ 55x65	CNC LATHE SL25	58.15	3.08	179.11
9/11/99	turn,face-lower collar ϕ 50x55	CNC LATHE SL25	58.15	9.5	552.46
10/11/99	turn,face-insert cavity bush(B) ϕ 70x90	CNC LATHE SL25	58.15	10	581.53
12/11/99	turn,face-upper collar ϕ 50x30	CNC LATHE SL25	58.15	12.25	712.38
2/11/99	turn-insert cavity bush(A-B) ϕ 70x90	CNC LATHE SL35	58.15	3.5	203.54
3/11/99	drill-insert cavity bush(B) ϕ 70x90	CNC LATHE SL35	58.15	7.75	450.69
12/11/99	mill-upper cavity plate 470x410x70	VMC1-FNC128	49.70	8.5	422.48
11/11/99	mill-lower cavity plate	HMC1-A77	49.70	38	1,888.72
Total					8,014.89

Table 3-15 Machining report of the mold S18

Date	Task	Machine used	Average(Bht.) labor cost/hr.	Machining hours	Labor cost
1/11/99	turn,face-upper cavity bush ϕ 85x190	CNC LATHE SL25	58.15	13.83	804.26
1/11/99	drill,turn,face-upper collar ϕ 55x20	CNC LATHE SL25	58.15	2	116.31
2/11/99	turn,face-upper collar ϕ 55x20	CNC LATHE SL25	58.15	4	232.61
2/11/99	turn outer skin-sleeve	CNC LATHE SL25	58.15	3.67	213.42
22/11/99	turn,face-upper cavity bush ϕ 85x60	CNC LATHE SL25	58.15	3.25	189.00
23/11/99	turn,face-upper cavity bush ϕ 85x60	CNC LATHE SL25	58.15	3.45	200.63
22/11/99	drill,face,turn-upper cavity bush ϕ 85x60	CNC LATHE SL35	58.15	10	581.53
3/11/99	mill runner-lower cavity plate	VMC1-FNC128	49.70	2.5	124.26
25/11/99	mill runner-upper cavity plate	VMC2-FNC106	49.70	3	149.11
Total					2611.14

Table 3-16 Machining report of the mold S25

Date	Task	Designer	Average(Bht.) labor cost/hr.	Design hours	Labor cost
21/9/99	servey existing mold - START	Amnat	71.29	8	570.34
30/9/99	check mold	Amnat	71.29	3.5	249.52
7/10/99	check mold	Amnat	71.29	8	570.34
8/10/99	design mold	Amnat	71.29	4.5	320.82
11/10/99	cesign mold	Amnat	71.29	8	570.34
12/10/99	cesign mold	Amnat	71.29	8	570.34
13/10/99	cesign mold	Amnat	71.29	8	570.34
14/10/99	cesign mold	Amnat	71.29	8	570.34
15/10/99	design mold	Amnat	71.29	8	570.34
18/10/99	cesign mold	Amnat	71.29	4.5	320.82
19/10/99	cesign mold - FINISH	Amnat	71.29	8	570.34
Total				76.5	5,453.88

Table 3-17 Design report of the mold S18

Date	Task	Designer	Average(Bht.) labor cost/hr.	Design hours	Labor cost
12/11/99	check existing drawing ,design mold - START	Navee	71.29	8	570.34
15/11/99	design mold - FINISH	Navee	71.29	8	570.34
Total				16	1,140.68

Table 3-18 Design report of the mold S25

Remarks: Calculation of Designer's cost per hour.

salary(Amnat+Opas+Paiboon+Navee)	36,190
accommodation allowance(level3x4@)	14,000
Total	50,190 per month

(6hrs. per day)x(22 days per month)x(4men)

total design hour available per month	704
Average labor cost per hour	71.29

Date	Task	Assembler	Average(Bht.) labor cost/hr.	Assembly hours	Labor cost
	Drill-cooling hole	Phantasak	56.14	12	673.64
	Surface finishing	Phantasak	56.14	4	224.55
	Final adjust & assembly	Phantasak	56.14	16	898.18
Total				32	1,796.36

Table 3-19 Assembly report of the mold S18

Date	Task	Assembler	Average(Bht.) labor cost/hr.	Assembly hours	Labor cost
	Adjust cavity bush & finish runner surface & assembly	Phantasak	56.14	8	449.09
Total				8	449.09

Table 3-20 Assembly report of the mold S25

Nattapol	18610
Suksa	13940
Chakrapong	8390
Total	40940
Man hours/month	528
Avg. labor cost/hr.	77.54
Avg.lab.cost/m/c hr.	58.15

Sumate	8250
Virat	10490
Viroj	7970
Total	26710
Man hours/month	528
Avg. labor cost/hr.	50.59

Nawapol	8390
Man hours/month	176
Avg. labor cost/hr.	47.67

CNC m/c centre(FNC128,FNC106,A77)

Chanya	0
Somchai	12620
Preecha	8420
Total	21040
Grand total	78730
Man hours/month	1232

Chamnien	0
Piya	11570
Chakris	8350
Total	19920

Witchien	18890
Chanasuk	10650
Manop	8230
Total	37770

Avg.labor cost/hr.= 63.90

Avg.lab.cost/m/c hr.= 49.70

AVERAGE LABOR COST

EDM, DRAWING

Pranode	7960
Man hours/month	176
Avg. labor cost/hr.	45.23

TOOLS,CAD,CAM

Anurak	17780
Man hours/month	176
Avg. labor cost/hr.	101.02

ASSEMBLY

Pongpat	11770
Silpachai	8370
Phantasak	7930
Panya	8070
Teerachat	13260
Total	49400
Man hours/month	880
Avg. labor cost/hr.	56.14

Grand total mold manufacturing

229,910 Baht per month

Table 3-21 Calculation of average labor cost per hour of direct labor in mold shop

3.3 Existing Mold Costing System of the Company

As stated in the introduction, that the existing mold costing system of the factory used the accumulated book value of each mold until present month (called total direct cost year-to-date) as the base in assigning these overhead costs to each mold at the month end. In addition, there were also other points being used as the assumption or agreement in assigning each kind of overhead cost to a mold. Calculation method was defined in the assumption below.

3.3.1 Assumptions on cost calculation of the existing system

1) **Direct cost** of a mold, such as direct material, ran directly into the cost center of that mold according to the record in each month. Direct labor cost was not included in this group, because the employee was paid by salary, which was constant and not relative to the contents of work.

2) **Indirect – variable costs (VC)** of mold department in each month namely, 1) department power, 2) tool & equipment, 3) other supplies, 4) repairs & unplanned maintenance, 5) other materials, 6) employees welfare (safety equipment), and 7) freight & handling, were assigned to every new mold manufactured in the mold shop in that month, based on the total direct cost year-to-date (YTD).

Actually, costs above included the part of old mold maintenance, and should be separated before. However, the factory assumed that the part of old mold maintenance was negligible, thus assigned 100% of these costs to new mold manufacturing.

Allocation formula:

$$\text{VC charged to a mold} = \frac{\text{monthly VC mold shop} \times \text{total direct cost(YTD) of a mold}}{\text{Sum of total direct cost(YTD) of all molds in the month}}$$

3) **Indirect – fixed costs (FC)** of mold department in each month namely, 1) mold manufacturing labor cost (both direct and indirect labor), and 2) department depreciation (machines, systems, and knowhow), were assigned to every new mold

manufactured in the mold shop in that month, based on the total direct cost year-to-date.

Nevertheless, since these costs were quite high and the factory did not want the mold cost to be too high, to maintain competitiveness, thus only 10% of these two costs were allocated to the molds. The other 90% were absorbed by other plastic products such as fittings, in the form of factory overhead.

Allocation formula:

$$\text{FC charged to a mold} = \frac{10\% \text{ monthly FC mold shop} \times \text{total direct cost (YTD) of a mold}}{\text{Sum of total direct cost (YTD) of all molds in the month}}$$

4) **Indirect – fixed cost** of 8 support functions (Assigned cost) in each month were presently allocated to mold shop based on weighted average percentage of service provided by each function to the mold shop. However, the factory did not assign this part of cost into the molds, again, from the same reason of price competitiveness. These costs were treated as factory overhead to be absorbed by other plastic products as well.

Therefore, mold cost calculation of the existing system covered only 3 from 4 groups of cost that really happened in mold manufacturing, and pushed some parts of the costs to other products of higher sales to decorate the operating performance of the company.

3.3.2 Existing Cost Calculation

From the assumption, calculation formula, and information shown in Table3-3 to 3-14, mold cost calculation using the existing system of the factory was performed by a work-sheet on MS-Excell, in Table3-22. The explanation of calculation procedure for each kind of cost, being direct cost, variable cost and fixed cost, was shown separately in Table3-23 to 3-25. The total cost of the mold S-18, and S-25, therefore, were concluded as Table 3-26 .

ACTUAL COST - MOULD

30/11/1998 (การขาดเดือน ต.ค. 42 และ พ.ย. 42 แล้วในบางส่วน)

ORDER NO.	228	229	230	234	238	240	241	242	243	244	245	248	249		TOTAL COST
NAME	VL DIA 18 NP	NIPPLE 20	45 L DIA 18	DRTY 80 X 55	OVER HAUL L 25	OVER HAUL B 25	EXCELLA EAVES FILLER	OVER HAUL S 18	OVER HAUL S 55	PLASTIC RING-88	OVER HAUL L 18	OVER HAUL T 25	PLASTIC ROD -88	WAVES EAVES FILLER	IN NOV.
RAWMAT	25,945.99	19,291.84	24,762.55	88,839.81	28,702.00	820.80	27,499.17			8,496.00	1,125.20	28,800.00	873.09		
OTHER RAWMAT															
TOTAL RAWMAT-MONTH	25,945.99	19,291.84	24,762.55	88,839.81	28,702.00	820.80	27,499.17	-	-	8,496.00	1,125.20	28,800.00	873.09	-	234,956.25
TOTAL RAWMAT-YTD	198,890.03	92,094.82	185,747.94	242,453.65	10,720.00	12,863.00	25,226.00	28,855.00	8,000.00	-	-	-	-	167,930.25	970,580.69
(VC) POWER	10,423.28	5,061.66	9,650.81	14,012.28	1,839.86	569.21	2,193.25	1,117.11	332.78	353.41	46.81	1,198.01	36.32	8,985.51	53,820.31
TOTAL POWER-MONTH	10,423.28	5,061.66	9,650.81	14,012.28	1,839.86	569.21	2,193.25	1,117.11	332.78	353.41	46.81	1,198.01	36.32	8,985.51	
TOTAL POWER-YTD	17,739.70	7,009.39	14,609.02	17,696.24	-	-	-	-	-	-	-	-	-	-	
(VC) TOOL & EQUIPMENT	40.07	19.46	37.10	53.87	8.30	2.19	8.43	4.29	1.28	1.36	0.18	4.61	0.14	28.86	208.15
(VC) OTHER SUPPLIES	3,030.91	1,471.84	2,806.29	4,074.52	478.84	165.52	637.76	324.83	98.77	102.77	13.61	348.36	10.56	2,031.28	15,591.84
(VC) REPAIRS & MAINT	410.42	199.31	380.01	551.74	64.57	22.41	86.36	43.99	13.10	13.92	1.84	47.17	1.43	275.08	2,111.34
(VC) OTHER MATERIALS	1,014.10	492.46	938.95	1,363.28	159.55	55.38	213.38	108.89	32.38	34.38	4.56	118.56	3.53	679.63	5,216.82
(VC) EMPLOYEES WELFARE	212.84	103.36	197.06	288.12	33.48	11.82	44.78	22.81	6.80	7.22	0.96	24.46	0.74	142.64	1,094.89
TOTAL ASSIGNED VC- MONTH	4,708.34	2,286.42	4,359.41	6,329.54	740.76	257.12	990.72	504.81	150.32	159.64	21.14	541.16	16.41	3,155.45	
TOTAL ASSIGNED VC- YTD	7,796.57	3,203.17	6,886.87	8,062.65	-	-	-	-	-	-	-	-	-	-	
OT OF PRODUCTIVE	287.90	129.24	262.32	377.30											
CONTRACTR-PIECE WORK															
TOTAL MONTH	287.90	129.24	262.32	377.30	-	-	-	-	-	-	-	-	-	-	
TOTAL YTD	401.21	81.98	197.19	10.25	-	-	-	-	-	-	-	-	-	-	
TOTAL DIRECT COST-MONTH	41,385.51	28,789.16	39,035.09	89,358.73	31,082.81	1,847.14	30,683.14	1,621.72	483.10	9,009.06	1,193.15	30,539.17	925.81	10,140.96	
TOTAL DIRECT COST-YTD	250,573.50	121,681.20	232,003.57	336,852.30	39,422.00	13,883.80	52,725.17	26,855.00	8,000.00	8,496.00	1,125.20	28,800.00	873.09	167,930.25	1,289,021.08
(FC) LABOUR (10% OF DL+IDL)	5,831.11	2,734.63	5,213.79	7,570.04	885.93	307.51	1,184.89	603.51	179.78	190.93	25.29	847.22	19.62	3,773.87	28,968.00
(FC) DEPRECIATION (10%)	11,864.88	5,781.70	10,985.56	15,950.23	1,866.66	647.94	2,496.58	1,271.61	378.81	402.29	53.28	1,363.70	41.34	7,951.63	81,036.20
TOTAL FIXED COST-MONTH	17,495.98	8,496.23	16,199.34	23,520.27	2,752.59	955.45	3,681.47	1,875.12	558.59	593.22	78.57	2,010.92	60.96	11,725.51	
TOTAL FIXED COST-YTD	25,844.31	10,047.25	20,982.49	26,039.63	-	-	-	-	-	-	-	-	-	-	
ACTUAL FULL COST-MONTH	58,861.47	35,285.39	55,234.44	112,879.00	33,835.20	2,802.59	34,364.60	3,496.83	1,041.89	9,602.28	1,271.71	32,550.10	986.78	21,866.47	
TOTAL ACTUAL FULL COST-YTD	309,333.29	147,702.00	283,457.95	406,131.32	44,555.20	15,465.59	59,590.80	30,351.83	9,041.69	9,602.28	1,271.71	32,550.10	986.78	189,796.72	

Note: (VC)=Variable cost

(FC)=Fixed cost

Table 3-22 A worksheet for mold cost calculation of the existing system

DIRECT COST ITEMS	MOLD S 18	MOLD S 25
1.DIRECT MATERIAL (before VAT 7%)	26,855.00	13,683.80
2.STANDARD PARTS	0	0
3.EQUIPMENT	0	0
TOTAL	26,855.00	13,683.80

TABLE 3-23 Direct Cost Calculation of the Existing System

VC COST ITEMS	100%MONTHLY EXPENSE (BAHT)	SUM OF total direct cost-YTD (Baht)	COST PER 10,000 BAHT OF total direct cost-YTD	ASSIGNED TO S-18 (26,855.00)	ASSIGNED TO S-25 (13,683.80)
POWER	53,620.31	1,289,021.08	415.98	1,117.11	569.21
SUPPLIES	15,591.84	1,289,021.08	120.96	324.83	165.52
OTHER MATERIALS	5,216.82	1,289,021.08	40.47	108.69	55.38
TOOLS&EQUIPMENT	206.15	1,289,021.08	1.60	4.29	2.19
MAINTENANCE	2,111.34	1,289,021.08	16.38	43.99	22.41
WELFARE	1,094.89	1,289,021.08	8.49	22.81	11.62
TOTAL	77,841.35	1,289,021.08	603.88	1,621.72	826.34

TABLE 3-24 Variable Cost Allocation of the Existing System

FC COST ITEMS	10%MONTHLY EXPENSE (BAHT)	SUM OF total direct cost-YTD (Baht)	COST PER 10,000 BAHT OF total direct cost-YTD	ASSIGNED TO S-18 (26,855.00)	ASSIGNED TO S-25 (13,683.80)
LABOR SALARY	17,900.00	1,289,021.08	138.87	372.92	190.02
SUPERVISOR SALARY	11,100.00	1,289,021.08	86.11	231.25	117.83
DEPRECIATION	61,000.00	1,289,021.08	473.23	1,270.85	647.55
TOTAL	90,000.00	1,289,021.08	698.20	1,875.03	955.41

TABLE 3-25 Fixed Cost (Mold Department) Allocation of the Existing System

COST	MOLD S-18	MOLD S-25
1. DIRECT COST – Total raw material used	26,855.00	13,683.80
2. FOH-VC allocated from mold department	1,621.72	826.33
3. FOH-FC allocated from mold department	1,875.12	955.45
4. FOH-FC allocated from support functions	Not allocated	Not allocated
Total cost	30,351.83	15,465.59

TABLE 3-26 Calculation result from the existing system