# Chapter 5

# Problem Analysis

## 5.1 Analysis on the Existing System

As determined in the assumption above, that the existing system did not cover the cost in group 4 (FOH-support functions), and 90% of cost in group 3 (FOH-FC mold department) because the pricing policy of the company. The company did not want the mold price quoted to the customer too high. The company also wanted to keep working on mold cost as simple as possible. Therefore, only the cost that is easily related to a mold was charged into the mold, and most of the fixed cost was pushed to other products in the form of factory overhead.

However, this study had different objective, that was to reflex the actual cost structure of mold manufacturing. Therefore, the existing system illustrated in chapter 3 could not be compared to other methods in this study, because the system was not accountable for all cost happened in mold manufacturing. Nevertheless, concept of the existing system would still be used in allocation of mold cost as a comparative method. But the assumption must be modified a little bit, to make the system cover all groups of cost.

### 5.1.1 Modifying Assumption of the existing system

1) **Direct cost** of a mold, such as direct material and direct expenses, ran directly into the cost center of that mold according to the record in each month.

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 75% to <u>new molds</u> manufactured in the mold shop in that month, based on the total direct cost year-to-date. (Another 25% left were assigned to <u>old mold</u> maintenance.) That was because these resources were also shared by old

mold maintenance, then should be charged based on the proportion of usage. In this assumption, the proportion of usage between mold manufacturing and mold maintenance were indicated by total machine hours consumed. The figures were shown at end of Table3-6.

Allocation formula:

$$\text{VC charged to a mold} = \frac{75\% \text{ monthly VC mold shop x total direct cost(YTD) of a mold}}{\text{Sum of total direct cost(YTD) of all molds in the month}}$$

**3) Indirect – fixed costs** (FC) of mold department in each month namely, 1) mold manufacturing labor cost (both direct and indirect), and 2)department depreciation, were assigned to every <u>new mold</u> manufactured in the mold shop in that month, based on the total direct cost year-to-date. 100% of labor cost was allocated to new molds, because the labor cost of mold maintenance was already separated. However, depreciation was assigned to mold manufacturing only 75%, and to mold maintenance 25%, according to total machine hours consumed by both functions at end of Table3-6.

Allocation formula:

$$\text{FC charged to a mold} = \frac{(100\% \text{monthly labor cost} + 75\% \text{depreciation})\text{x total direct cost(YTD) of a mold}}{\text{Sum of total direct cost(YTD) of all molds in the month}}$$

**4) Indirect – fixed cost** of 8 support functions (Assigned cost) in each month were firstly allocated to mold shop based on weighted average percentage of service provided by each function to the mold shop. Then, 75% of the cost was assigned to every new mold manufactured in the mold shop in that month, based on the total direct cost year-to-date. Certainly, another 25% went to mold maintenance.

Allocation formula:

$$\text{Assigned cost charged to a mold} = \frac{(75\% \text{assigned cost of mold department })\text{x total direct cost(YTD) of a mold}}{\text{Sum of total direct cost(YTD) of all molds in the month}}$$

ACTUAL COST - MOULD

30/11/1999 (กระจายเดือน ตค 42 และ พย.42 แล้วในบางส่วน)

| ORDER NO. | 228 | 229 | 230 | 234 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 249 | | TOTAL COST |
| NAME | VL DIA 18 NP | NIPPLE 20 | 45 L DIA 18 | DRTY 60 X 55 | OVER HAUL L 2 | OVER HAUL S 20 | EXCELLA EAVES FILLE | OVER HAUL S 18 | OVER HAUL S 55 | PLASTIC RING-SS | OVER HAUL L 18 | OVER HAUL T 25 | PLASTIC ROD -SS | WAVES EAVES FILLE | IN NOV. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RAWMAT | 25,945.99 | 19,291.84 | 24,762.55 | 68,639.61 | 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 | 68,639.61 | 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 | 198,690.03 | 92,094.82 | 185,747.94 | 242,453.65 | 10,720.00 | 12,863.00 | 25,226.00 | 26,855.00 | 8,000.00 | - | - | - | - | 167,930.25 | 970,580.69 |
| (VC) POWER 75% | 7,817.46 | 3,796.24 | 7,238.11 | 10,509.21 | 1,229.90 | 426.91 | 1,644.93 | 837.83 | 249.59 | 265.06 | 35.10 | 898.51 | 27.24 | 5,239.13 | 40,215.23 |
| TOTAL POWER-MONTH | 7,817.46 | 3,796.24 | 7,238.11 | 10,509.21 | 1,229.90 | 426.91 | 1,644.93 | 837.83 | 249.59 | 265.06 | 35.10 | 898.51 | 27.24 | 5,239.13 | |
| TOTAL POWER-YTD | 17,739.70 | 7,009.39 | 14,609.02 | 17,696.24 | - | - | - | - | - | - | - | - | - | - | |
| (VC) TOOL & EQUIPMENT 75% | 40.07 | 14.60 | 27.83 | 40.40 | 4.73 | 1.64 | 6.32 | 3.22 | 0.96 | 1.02 | 0.13 | 3.45 | 0.10 | 20.14 | 154.61 |
| (VC) OTHER SUPPLIES 75% | 3,030.91 | 1,103.88 | 2,104.71 | 3,055.89 | 357.63 | 124.14 | 478.32 | 243.83 | 72.58 | 77.07 | 10.21 | 261.27 | 7.92 | 1,523.45 | 11,693.88 |
| (VC) REPAIRS & MAINT. 75% | 410.42 | 149.48 | 285.01 | 413.81 | 48.43 | 16.81 | 64.77 | 32.99 | 9.83 | 10.44 | 1.38 | 35.38 | 1.07 | 206.29 | 1,583.51 |
| (VC) OTHER MATERIALS 75% | 1,014.10 | 369.34 | 704.21 | 1,022.46 | 119.66 | 41.53 | 160.04 | 81.51 | 24.28 | 25.79 | 3.42 | 87.42 | 2.65 | 509.73 | 3,912.62 |
| (VC) EMPLOYEES'WELFARE 75% | 212.84 | 77.62 | 147.80 | 214.59 | 25.11 | 8.72 | 33.59 | 17.11 | 5.10 | 5.41 | 0.72 | 18.35 | 0.56 | 106.98 | 821.17 |
| TOTAL ASSIGNED VC- MONTH | 4,708.34 | 1,714.82 | 3,269.56 | 4,747.16 | 555.56 | 192.84 | 743.04 | 378.46 | 112.74 | 119.73 | 15.86 | 405.87 | 12.30 | 2,366.59 | |
| TOTAL ASSIGNED VC- YTD | 7,796.57 | 3,203.17 | 6,686.87 | 8,052.55 | - | - | - | - | - | - | - | - | - | - | |
| OT OF PRODUCTIVE | 267.00 | 129.24 | 262.32 | 377.30 | | | | | | | | | | | |
| CONTRACTR-PIECE WORK | | | | | | | | | | | | | | | |
| TOTAL MONTH | 287.00 | 129.24 | 262.32 | 377.30 | - | - | - | - | - | - | - | - | - | - | |
| TOTAL YTD | 401.21 | 81.96 | 197.19 | 10.25 | - | - | - | - | - | - | - | - | - | - | |
| TOTAL DIRECT COST-MONTH | 38,759.69 | 24,932.14 | 35,532.64 | 84,273.28 | 30,487.46 | 1,440.55 | 29,887.14 | 1,216.29 | 362.33 | 8,880.79 | 1,176.16 | 30,104.38 | 912.63 | 7,605.72 | |
| TOTAL DIRECT COST-YTD | 260,673.60 | 121,681.20 | 232,003.67 | 336,062.30 | 39,422.00 | 13,683.00 | 52,725.17 | 26,055.00 | 8,000.00 | 8,496.00 | 1,125.20 | 28,800.00 | 873.09 | 167,930.25 | 1,289,021.08 |
| (FC) LABOUR (100% OF DL+IDL) | 56,311.05 | 27,345.25 | 52,137.85 | 75,700.37 | 8,859.25 | 3,075.14 | 11,848.86 | 6,035.09 | 1,797.83 | 1,909.29 | 252.86 | 6,472.19 | 196.21 | 37,738.74 | 289,680.00 |
| (FC) DEPRECIATION (75%) | 88,986.45 | 43,212.78 | 82,391.69 | 119,626.73 | 13,999.98 | 4,859.54 | 18,724.35 | 9,537.05 | 2,841.05 | 3,017.19 | 399.59 | 10,227.78 | 310.06 | 59,637.26 | 457,771.50 |
| TOTAL FIXED COST-MONTH | 145,297.50 | 70,558.04 | 134,529.54 | 195,327.11 | 22,859.23 | 7,934.69 | 30,573.21 | 15,572.13 | 4,638.88 | 4,926.49 | 652.46 | 16,699.96 | 506.27 | 97,376.00 | |
| TOTAL FIXED COST-YTD | 25,844.31 | 10,047.25 | 20,982.49 | 26,039.63 | - | - | - | - | - | - | - | - | - | - | |
| ALLOCATED 75% FOH-SUPPORT | 49,520.02 | 24,047.46 | 45,860.10 | 66,571.01 | 7,790.84 | 2,704.28 | 10,419.90 | 5,307.27 | 1,581.01 | 1,679.04 | 222.37 | 5,691.85 | 172.55 | 33,187.50 | 254,745.00 |
| ACTUAL FULL COST-MONTH | 233,577.21 | 119,537.63 | 215,912.18 | 346,171.40 | 61,137.53 | 12,079.52 | 70,880.25 | 22,095.69 | 6,582.22 | 15,486.32 | 2,050.99 | 52,495.99 | 1,591.45 | 138,169.23 | |
| TOTAL ACTUAL FULL COST-YTD | 484,049.63 | 231,974.24 | 444,135.69 | 639,423.72 | 71,857.53 | 24,942.52 | 96,108.25 | 48,950.69 | 14,582.22 | 15,486.32 | 2,050.99 | 52,495.99 | 1,591.45 | 306,099.48 | |

Note: (VC)=Variable cost

(FC)=Fixed cost

Table 5-1   A worksheet for mold cost calculation of the modified system

### 5.1.2  Cost Calculation after existing assumption modified

From the modified assumption, the existing system was adjusted to cover 4
groups of cost in mold manufacturing.  Cost calculation by MS-Excel worksheet in Table
3-22 was adjusted to be as in table 5-1.  The resulting costs of the mold S-18, and S-25
from Table5-1 could be listed as Table5-2 below.  Separate calculation table of each
group would be shown later in the next part, in Table5-5, 5-9, and 5-11, as a comparing
method.

| 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 | 1,216.29 | 619.75 |
| 3. FOH-FC allocated from mold department | 15,572.14 | 7,934.68 |
| 4. FOH-FC allocated from support functions | 5,307.27 | 2,704.28 |
| Total cost | 48,950.69 | 24,942.52 |

**TABLE 5-2   Calculation Result from the Modifying existing system**

Table5-2 represented the costs of two sample molds that were calculated based
on total direct cost year-to-date of the molds.  Total direct cost of a mold mostly
consisted of cost of raw material.  Therefore, overhead cost allocated to each mold by
this method would vary considerably on direct material contents.

## 5.2   Comparison between Traditional Job shop Methods

From the existing system of the company, the concept used in assigning
overhead costs to a mold was similar to the allocation that was based on raw material
contents. Next, three kinds of overhead costs, namely Variable overhead cost (FOH-
VC) of mold department, Fixed overhead cost (FOH-FC) of mold department, and Fixed
overhead cost (FOH-FC) of support functions, would be analyzed group by group.
Other available traditional concepts used in cost allocation of each cost group would be
presented in comparison.

## 5.2.1 Overhead-Variable cost of mold department

This group of overhead cost occurred from resources consumed variably by mold shop in each month. For instance, these costs were power for machines, supplies, other materials, tools&equipment, maintenance, and welfare(safety equipment) used by mold shop in a month. Consumption of these resources depended considerably on the activities within mold shop in each month. In some months, there were a lot of works done thus a lot of resources were consumed. The figures used in sample calculation in this study were variable cost information in November being expressed in table3-3. Next would be the allocation of these costs into the sample molds by traditional concepts available.

### 5.2.1.1 Allocation based on machine hours used.

The actual variable costs consumed by mold shop in a month were allocated to every mold, of both manufacturing tasks and maintenance tasks, based on machine hours used by the mold. This concept assumed that resource consumption varied on machining time. The more time a mold being worked, the more resources it consumed. From Table3-6,3-7,3-8, the information of machine hours used for all tasks in November, for the mold S-18, and S-25 were presented respectively. Machine hours were used as a base in allocating variable costs of mold shop into two sample molds, as in Table5-3 below.

| VC COST ITEMS | MONTHLY EXPENSE (BAHT) | TOTAL MC HRS USED (HOURS) | COST PER UNIT HOUR (BAHT) | ASSIGNED TO S-18 (173.75 HOURS) | ASSIGNED TO S-25 (45.7 HOURS) |
|---|---|---|---|---|---|
| POWER | 53,620.31 | 2,292.94 | 23.3850 | 4,063.14 | 1,068.69 |
| SUPPLIES | 15,591.84 | 2,292.94 | 6.7999 | 1,181.49 | 310.76 |
| OTHER MATERIALS | 5,216.82 | 2,292.94 | 2.2752 | 395.31 | 103.98 |
| TOOLS&EQUIPMENT | 206.15 | 2,292.94 | 0.0899 | 15.62 | 4.11 |
| MAINTENANCE | 2,111.34 | 2,292.94 | 0.9208 | 159.99 | 42.08 |
| WELFARE | 1,094.89 | 2,292.94 | 0.4775 | 82.97 | 21.82 |
| TOTAL | 77,841.35 | 2,292.94 | 33.9483 | 5,898.51 | 1,551.44 |

TABLE 5-3 Allocation of Variable cost of mold department to the molds, based on machine hours

## 5.2.1.2 Allocation based on raw material contents.

The actual variable costs consumed by mold shop in a month were allocated to every mold, of both manufacturing tasks and maintenance tasks, based on total cost of raw material in the mold. This concept assumed that resource consumption varied on the contents of raw material.  The larger a mold was, the higher resources it consumed.

Unfortunately, the information of old molds maintenance was not available at all. Mold maintenance was done without systematic task recording.  And the specific information of old molds was hardly available. There was only the information of new molds just being manufactured.  Therefore, this study allocated 25% of total variable cost of mold shop to mold maintenance tasks, based on ratio of machine hours used for mold maintenance.  Then only 75% of total variable cost of mold shop was allocated into every new mold based on cost of raw material. From Table3-6,3-7, and3-8, the information of raw material of all molds manufactured in November, of the mold S-18, and S-25 were presented respectively.  The calculation was performed in the Table5-4 below.

| VC COST ITEMS | 75% MONTHLY EXPENSE (BAHT) | TOTAL RAW MATERIAL VALUE (BAHT) | COST PER 10,000 BAHT OF RAW MATERIAL | ASSIGNED TO S-18 (26,855.00) | ASSIGNED TO S-25 (13,683.80) |
|---|---|---|---|---|---|
| POWER | 40,215.23 | 1,205,536.94 | 333.59 | 895.85 | 456.47 |
| SUPPLIES | 11,693.88 | 1,205,536.94 | 97.00 | 260.50 | 132.73 |
| OTHER MATERIALS | 3,912.62 | 1,205,536.94 | 32.46 | 87.16 | 44.41 |
| TOOLS&EQUIPMENT | 154.61 | 1,205,536.94 | 1.28 | 3.44 | 1.75 |
| MAINTENANCE | 1,583.51 | 1,205,536.94 | 13.14 | 35.27 | 17.97 |
| WELFARE | 821.17 | 1,205,536.94 | 6.81 | 18.29 | 9.32 |
| TOTAL | 58,381.01 | 1,205,536.94 | 484.27 | 1,300.52 | 662.67 |

**TABLE 5-4  Allocation of VC of Mold department to the molds, based on raw material**

### 5.2.1.3 Allocation based on total direct cost-YTD (the existing system after modified).

The actual variable costs consumed by mold shop in a month were allocated to every mold, of both manufacturing tasks and maintenance tasks, based on total direct cost-YTD of the mold, which was an accumulation of raw material cost and variable cost assigned from start until present of a mold. This concept assumed that resource consumption varied on the contents of raw material and the length of time period a mold stayed in the mold shop. The larger a mold was, and the longer a mold stayed, the higher resources it consumed.

From the same reason about some resources being shared by mold maintenance, only 75% of total variable cost of mold shop was allocated into every new mold based on total direct cost-YTD of a mold. From Table3-6,3-7, and3-8, the information of total direct cost-YTD of all molds manufactured in November, of the mold S-18, and S-25 were presented respectively. The calculation was performed in the Table5-5 below.

| VC COST ITEMS | 75%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 | 40,215.23 | 1,289,021.08 | 311.98 | 837.83 | 426.91 |
| SUPPLIES | 11,693.88 | 1,289,021.08 | 90.72 | 243.63 | 124.14 |
| OTHER MATERIALS | 3,912.62 | 1,289,021.08 | 30.35 | 81.51 | 41.53 |
| TOOLS&EQUIPMENT | 154.61 | 1,289,021.08 | 1.20 | 3.22 | 1.64 |
| MAINTENANCE | 1,583.51 | 1,289,021.08 | 12.28 | 32.99 | 16.81 |
| WELFARE | 821.17 | 1,289,021.08 | 6.37 | 17.11 | 8.72 |
| TOTAL | 58,381.01 | 1,289,021.08 | 452.91 | 1,216.29 | 619.75 |

**TABLE 5-5  Allocation of VC of Mold department to the molds, based on total direct cost-YTD**

### 5.2.1.4 Comparing on result of traditional methods of allocation, of Variable cost of mold department.

The variable cost of mold department allocated from traditional calculation methods in Table3-24, 5-3, 5-4, and 5-5 were concluded and compared in the Table 5-6 below.

| TRADITIONAL VC ALLOCATING METHODS | MOLD S 18 | MOLD S 25 |
|---|---|---|
| 1.EXISTING SYSTEM | 1,621.72 | 826.33 |
| 2.BASED ON MACHINE HOURS | 5,898.51 | 1,551.44 |
| 3.BASED ON RAW MATERIAL | 1,300.52 | 662.67 |
| 4.BASED ON Total Direct Cost-YTD (adjusted) | 1,216.29 | 619.75 |

TABLE 5-6  Comparison of results between traditional methods used to allocate Variable Cost of Mold   department to the molds

## 5.2.2 Overhead-Fixed cost of mold department

This group of overhead cost occurred from resources consumed constantly by mold shop in every month.  For instance, these costs were labor salary, supervisor salary, machine and equipment depreciation, and planned maintenance within mold shop in a month. These costs happened every month regardless of the activities within mold shop in the month.  In a month, whether there were a lot of works done or a little of works done, these costs were the same.

Then, idle capacity was another significant factor to be considered.  If idle time was high, cost per unit in that month would be high too. To handle cost of idle capacity was another difficult thing to decide, depended on the policy. Some companies chose to charge these costs direct to the customers, while some companies absorbed these costs into factory overhead cost to avoid problems in price competitiveness.  Since the characteristic of idle capacity in this case was unknown.  This study would charge the cost of idle capacity to the customers in each month. The figures used in sample calculation in this study were fixed cost information in November being expressed in

Table3-4. Next would be the allocation of these costs into the sample molds by traditional concepts available.

### 5.2.2.1 Allocation based on machine hours used.

The actual fixed costs consumed by mold shop in a month were allocated to every mold, of both manufacturing tasks and maintenance tasks, based on machine hours used by the mold. This concept assumed that resource consumption varies on machining time. The more time a mold being worked, the more resources it consumed. From Table3-6,3-7, and3-8, the information of machine hours used for all tasks in November, for the mold S-18, and S-25 were presented respectively. Machine hours were used as a base in allocating fixed costs of mold shop into two sample molds, as in Table5-7 below.

| FC COST ITEMS | MONTHLY EXPENSE (BAHT) | TOTAL M/C HRS USED (HOURS) | COST PER UNIT HOUR (BAHT) | ASSIGNED TO S-18 (173.75 HOURS) | ASSIGNED TO S-25 (45.7 HOURS) |
|---|---|---|---|---|---|
| LABOR SALARY | 179,000.00 | 2,292.94 | 78.0657 | 13,563.92 | 3,567.60 |
| SUPERVISOR SALARY | 111,000.00 | 2,292.94 | 48.4095 | 8,411.14 | 2,212.31 |
| DEPRECIATION | 610,000.00 | 2,292.94 | 266.0340 | 46,223.41 | 12,157.75 |
| MAINTENANCE | 5,000.00 | 2,292.94 | 2.1806 | 378.88 | 99.65 |
| TOTAL | 905,000.00 | 2,292.94 | 394.6898 | 68,577.35 | 18,037.32 |

**TABLE 5-7  Allocation of FC of Mold Manufacturing to the molds, based on Machine hours**

### 5.2.2.2 Allocation based on raw material contents.

The actual fixed costs consumed by mold shop in a month were allocated to every mold, of both manufacturing tasks and maintenance tasks, based on total cost of raw material in the mold. This concept assumed that resource consumption varied on the contents of raw material. The larger a mold was, the higher resources it consumed.

Unfortunately, the information of old molds maintenance was not available at all. Mold maintenance was done without systematic task recording. And the specific

information of old molds was hardly available. There was only the information of new molds just being manufactured. Therefore, this study allocated 25% of depreciation and maintenance of mold shop to mold maintenance tasks, based on ratio of machine hours used for mold maintenance. Then, only 75% of depreciation and maintenance of mold shop was allocated into every new mold based on cost of raw material. The labor cost, both direct and indirect, was allocated 100% to mold manufacturing because the labor of mold maintenance was already separated.

From Table 3-6, 3-7, and3-8, the information of raw material of all molds manufactured in November, of the mold S-18, and S-25 were presented respectively. The calculation was performed in the Table5-8 below.

| FC COST ITEMS | 75%MONTHLY EXPENSE (BAHT) | TOTAL RAW MATERIAL VALUE (BAHT) | COST PER 10,000 BAHT OF RAW MATERIAL | ASSIGNED TO S-18 (26,855.00) | ASSIGNED TO S-25 (13,683.80) |
|---|---|---|---|---|---|
| LABOR SALARY | 179,000.00 | 1,205,536.94 | 1,484.82 | 3,987.47 | 2,031.79 |
| SUPERVISOR SALARY | 111,000.00 | 1,205,536.94 | 920.75 | 2,472.68 | 1,259.94 |
| DEPRECIATION | 457,500.00 | 1,205,536.94 | 3,794.99 | 10,191.44 | 5,192.99 |
| MAINTENANCE | 3,750.00 | 1,205,536.94 | 31.11 | 83.54 | 42.57 |
| TOTAL | 751,250.00 | 1,205,536.94 | 6,231.66 | 16.735.13 | 8,527.28 |

**TABLE 5-8   Allocation of FC of Mold Manufacturing to the molds, based on Raw Material**

### 5.2.2.3 Allocation based on total direct cost-YTD (the existing system after modified).

The actual fixed costs consumed by mold shop in a month were allocated to every mold, of both manufacturing tasks and maintenance tasks, based on total direct cost-YTD of the mold, which was an accumulation of raw material cost and variable cost assigned from start until the present of a mold. This concept assumed that resource consumption varied on the contents of raw material and the length of time period a mold stayed in the mold shop. The larger a mold was, and the longer a mold stayed, the higher resources it consumed.

From the same reason about some resources being shared by mold maintenance, only 75% of depreciation and maintenance of mold shop was allocated into every new mold based on total direct cost-YTD of a mold. However, labor cost was allocated 100%. From Table3-6, 3-7, and3-8, the information of total direct cost-YTD of all molds manufactured in November, of the mold S-18, and S-25 were presented respectively. The calculation was performed in the Table5-9 below.

| FC COST ITEMS | 75%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 | 179,000.00 | 1,289,021.08 | 1,388.65 | 3,729.22 | 1,900.20 |
| SUPERVISOR SALARY | 111,000.00 | 1,289,021.08 | 861.12 | 2,312.53 | 1,178.34 |
| DEPRECIATION | 457,500.00 | 1,289,021.08 | 3,549.20 | 9,531.39 | 4,856.66 |
| MAINTENANCE | 3,750.00 | 1,289,021.08 | 29.09 | 78.13 | 39.81 |
| TOTAL | 751,250.00 | 1,289,021.08 | 5,828.07 | 15,651.27 | 7,975.01 |

**TABLE 5-9  Allocation of FC of Mold Manufacturing to the molds, based on Total direct cost-YTD**

### 5.2.2.4 Comparing on result of traditional methods of allocation, of Fixed cost of mold department.

The fixed cost of mold department allocated from traditional calculation methods in Table3-18, 5-7, 5-8, and 5-9 were concluded and compared in the Table5-10 below.

| TRADITIONAL FC ALLOCATING METHODS | MOLD S 18 | MOLD S 25 |
|---|---|---|
| 1.EXISTING SYSTEM | 1,875.03 | 955.41 |
| 2.BASED ON MACHINE HOURS | 68,577.35 | 18,037.32 |
| 3.BASED ON RAW MATERIAL | 16,735.13 | 8,527.28 |
| 4.BASED ON Total Direct Cost-YTD (adjusted) | 15,651.27 | 7,975.01 |

**TABLE 5-10  Comparison of results between traditional methods used to allocate Fixed Cost of Mold Manufacturing to the molds**

## 5.2.3  FOH-FC of support functions

This group of overhead cost occurred from resources consumed constantly by eight support functions in every month.  These costs happened every month regardless of the activities within mold shop or other production units in the month.  In a month, whether there were a lot of works done or a little of works done, these costs were the same.

Since these costs happened from activities that, were quite far from mold manufacturing operation and were consumed by many departments, allocating the cost direct to the mold was·impossibly difficult.  Because the nature of production departments, which use services from these support functions, was different.  Plastic products were produced in mass while molds were manufactured job by job.  Therefore, these costs were allocated to every production department, by first stage base.  For mold shop, a part of these factory overheads would be assigned to the mold shop based on various allocating concepts.  Then, mold shop would further allocate the costs received to the molds, based on second stage base that was relevant to the first stage base.

### 5.2.3.1 Five traditional combinations of First-Second Stage allocation bases, used for Fixed cost-support.

In this study, there were five traditional combinations used to allocate costs of support functions to the mold.

1) The existing system after being adjusted. First stage allocation was based on "Weighted-average percent of service" that support functions supplied to mold shop. Then, the cost would be further assigned to the molds based on "Total direct cost-YTD".

2) First stage allocation was based on "Simple percentages of service" that support functions supplied to mold shop. Then, the cost would be further assigned to the molds based on "Machine hours".

3) First stage allocation was based on "Company's sales contribution" that belongs to mold shop. Then, the cost would be further assigned to the molds based on "Total direct cost-YTD".

4) First stage allocation was based on "Area" of mold shop compared with other production departments. Then, the cost would be further spread equally to every mold being worked in the mold shop in a month.

5) First stage allocation was based on "Man power" of mold shop compared with other production departments. Then, the cost would be further assigned to the molds based on "Machine hours".

**5.2.3.2 Calculation of five methods.**

The calculation of these five methods was shown next, in Table 5-11 to 5-15.

| PRODUCT CATEGORIES (Production Departments) | SUPPORT DEPARTMENTS (PERCENT SERVICE AND MAN POWER) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PLANT SERVICE | | MAINTENANCE | | STAT.&DATA | | MOLD DESIGN | | ACCOUNTING | | PERSONNEL | | WEIGHTED AVERAGE | |
| | % | MAN | % | MAN | % | MAN | % | MAN | % | MAN | % | MAN | % | MAN |
| FITTING & other products | 60 | 5 | 75 | 8 | 70 | 6 | 20 | 4 | 65 | 8 | 65 | 2 | 62 | 33 |
| PALLET | 15 | 5 | 10 | 8 | 15 | 6 | 0 | 4 | 5 | 8 | 5 | 2 | 9 | 33 |
| DOOR&WINDOW | 20 | 5 | 15 | 8 | 15 | 6 | 0 | 4 | 10 | 8 | 10 | 2 | 12 | 33 |
| MOLD | 5 | 5 | 0 | 8 | 0 | 6 | 80 | 4 | 20 | 8 | 20 | 2 | 17 | 33 |
| TOTAL | 100 | | 100 | | 100 | | 100 | | 100 | | 100 | | 100 | |

TABLE 5-11 /1 - CALCULATION OF WEIGHTED AVERAGE PERCENTAGE OF SERVICE THAT 8 SUPPORT FUNCTIONS SUPPLY TO EACH PRODUCTION

| PRODUCT CATEGORIES (Production Departments) | FIXED COST OF SUPPORT FUNCTIONS | | | | | | | | | | | | | | | | TOTAL ASSIGNED FIXED COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PLANT SERVICE | | Plant Mgr. OFFICE | | MAINTENANCE | | STAT.&DATA | | LAB | | MOLD DESIGN | | ACCOUNTING | | PERSONNEL | | |
| | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | BAHT |
| FITTING & other products | 62 | 442680 | 62 | 63860 | 62 | 114700 | 62 | 71300 | 62 | 58900 | 62 | 42160 | 62 | 132060 | 62 | 313100 | 1,238,760 |
| PALLET | 9 | 64260 | 9 | 9270 | 9 | 16650 | 9 | 10350 | 9 | 8550 | 9 | 6120 | 9 | 19170 | 9 | 45450 | 179,820 |
| DOOR&WINDOW | 12 | 85680 | 12 | 12360 | 12 | 22200 | 12 | 13800 | 12 | 11400 | 12 | 8160 | 12 | 25560 | 12 | 60600 | 239,760 |
| MOLD | 17 | 121380 | 17 | 17510 | 17 | 31450 | 17 | 19550 | 17 | 16150 | 17 | 11560 | 17 | 36210 | 17 | 85850 | 339,660 |
| TOTAL | 100 | 714000 | 100 | 103000 | 100 | 185000 | 100 | 115000 | 100 | 95000 | 100 | 68000 | 100 | 213000 | 100 | 505000 | 1,998,000 |

TABLE 5-11 /2 - FIRST STAGE ALLOCATION OF FIXED COST, FROM 8 SUPPORT FUNCTIONS TO PRODUCTION DEPARTMENTS, BASED ON WEIGHTED AVERAGE PERCENTAGE OF SERVICE

| MOLD NAME | TOTAL DIRECT COST-YTD (from TABLE20) | | | TOTAL ASSIGNED FIXED COST | | ASSIGNED FIXED COST TO A MOLD (BAHT) |
|---|---|---|---|---|---|---|
| | MOLD | SUM (14 new molds) | RATIO (MOLD/SUM) | TO MOLD DEPARTMENT | TO MOLD MANUF. (75%)* | |
| S 18 | 26,855.00 | 1,289,021.08 | 0.02083 | 339,660 | 254,745 | 5,307.27 |
| S 25 | 13,683.80 | 1,289,021.08 | 0.01062 | 339,660 | 254,745 | 2,704.28 |

TABLE 5-11 /3 - SECOND STAGE ALLOCATION OF FIXED COST, FROM MOLD DEPARTMENT TO THE MOLD S18, AND S25, BASED ON TOTAL DIRECT COST -YTD

Assumption*: Total assigned fixed cost to the MOLD Department is divided 75% into NEW MOLD manufacturing, and 25% into OLD MOLD maintenance, based on machine hours proportion.

TABLE 5-11 ALLOCATION OF FIXED COST OF SUPPORT FUNCTIONS TO THE MOLD BY

THE FIRST COMBINATION OF ALLOCATION BASES

| PRODUCT CATEGORIES | FIXED COST OF SUPPORT FUNCTIONS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PLANT SERVICE | | Plant Mgr. OFFICE | | MAINTENANCE | | STAT.&DATA | | LAB | | MOLD DESIGN | | ACCOUNTING | | PERSONNEL | | TOTAL ASSIGNED FIXED COST |
| (Production Departments) | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | BAHT |
| FITTING & other products | 60 | 428400 | 60 | 61800 | 75 | 138750 | 70 | 80500 | 70 | 66500 | 20 | 13600 | 65 | 138450 | 65 | 328250 | 1,256,250 |
| PALLET | 15 | 107100 | 15 | 15450 | 10 | 18500 | 15 | 17250 | 15 | 14250 | 0 | 0 | 5 | 10650 | 5 | 25250 | 208,450 |
| DOOR&WINDOW | 20 | 142800 | 20 | 20600 | 15 | 27750 | 15 | 17250 | 15 | 14250 | 0 | 0 | 10 | 21300 | 10 | 50500 | 294,450 |
| MOLD | 5 | 35700 | 5 | 5150 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 54400 | 20 | 42600 | 20 | 101000 | 238,850 |
| TOTAL | 100 | 714000 | 100 | 103000 | 100 | 185000 | 100 | 115000 | 100 | 95000 | 100 | 68000 | 100 | 213000 | 100 | 505000 | 1,998,000 |

TABLE 5-12 /1 - FIRST STAGE ALLOCATION OF FIXED COST, FROM 8 SUPPORT FUNCTIONS TO PRODUCTION DEPARTMENTS, BASED ON ESTIMATED PERCENTAGE OF SERVICE OF EACH FUNCTION

| MOLD NAME | TOTAL MACHINE HOURS USED IN A MONTH (TABLE39) | | | TOTAL ASSIGNED FIXED-COST TO MOLD DEPARTMENT* (TABLE31/1) | ASSIGNED FIXED COST TO A MOLD (BAHT) |
|---|---|---|---|---|---|
| | MOLD | SUM (all molds) | RATIO (MOLD/SUM) | | |
| S 18 | 173.75 | 2,292.94 | 0.07578 | 238,850 | 18,099.12 |
| S 25 | 45.70 | 2,292.94 | 0.01993 | 238,850 | 4,760.46 |

TABLE 5-12 /2 - SECOND STAGE ALLOCATION OF FIXED COST, FROM MOLD DEPARTMENT TO THE MOLD S18, AND S25, BASED ON MACHINE HOURS

Assumption*: the information of machine hours already includes both new molds produced and old molds repaired, thus no need to devide the department's

assigned fixed cost into 2 parts by estimated percentage(75:25)

TABLE 5-12  ALLOCATION OF FIXED COST OF SUPPORT FUNCTIONS TO THE MOLD BY

THE SECOND COMBINATION OF ALLOCATION BASES

| PRODUCT CATEGORIES | ESTIMATED SALES RATIO | SALES PERCENTAGE | |
|---|---|---|---|
| FITTING & others | 78 | % | 71.56 |
| PALLET | 11 | % | 10.09 |
| PROFILE(door&window) | 15 | % | 13.76 |
| MOLD | 5 | % | 4.59 |
| TOTAL | 109 | % | 100 |

TABLE5-13 /1 - ESTIMATED SALES RATIO AND PERCENTAGE OF THE FACTORY

| PRODUCT CATEGORIES (Production Departments) | FIXED COST OF SUPPORT FUNCTIONS | | | | | | | | | | | | | | | | TOTAL ASSIGNED FIXED COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PLANT SERVICE | | Plant Mgr. OFFICE | | MAINTENANCE | | STAT.&DATA | | LAB | | MOLD DESIGN | | ACCOUNTING | | PERSONNEL | | |
| | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | BAHT |
| FITTING & other products | 71.6 | 510938 | 71.6 | 73706.8 | 71.6 | 132386 | 71.6 | 82294 | 71.6 | 67982 | 71.6 | 48660.8 | 71.6 | 152423 | 71.6 | 361378 | 1,429,769 |
| PALLET | 10.1 | 72042.6 | 10.1 | 10392.7 | 10.1 | 18666.5 | 10.1 | 11603.5 | 10.1 | 9585.5 | 10.1 | 6861.2 | 10.1 | 21491.7 | 10.1 | 50954.5 | 201,598 |
| DOOR&WINDOW | 13.8 | 98246.4 | 13.8 | 14172.8 | 13.8 | 25456 | 13.8 | 15824 | 13.8 | 13072 | 13.8 | 9356.8 | 13.8 | 29308.8 | 13.8 | 69488 | 274,925 |
| MOLD | 4.59 | 32772.6 | 4.59 | 4727.7 | 4.59 | 8491.5 | 4.59 | 5278.5 | 4.59 | 4360.5 | 4.59 | 3121.2 | 4.59 | 9776.7 | 4.59 | 23179.5 | 91,708 |
| TOTAL | 100 | 714000 | 100 | 103000 | 100 | 185000 | 100 | 115000 | 100 | 95000 | 100 | 68000 | 100 | 213000 | 100 | 505000 | 1,998,000 |

TABLE 5-13 /2 - FIRST STAGE ALLOCATION OF FIXED COST, FROM 8 SUPPORT FUNCTIONS TO PRODUCTION DEPARTMENTS, BASED ON SALES (PERCENTAGE)

| MOLD NAME | TOTAL DIRECT COST-YTD (from TABLE20) | | | TOTAL ASSIGNED FIXED COST | | ASSIGNED FIXED COST TO A MOLD (BAHT) |
|---|---|---|---|---|---|---|
| | MOLD | SUM (14 new molds) | RATIO (MOLD/SUM) | TO MOLD DEPARTMENT | TO MOLD MANUF.(75%)* | |
| S 18 | 26,855.00 | 1,289,021.08 | 0.02083 | 91,708 | 68,781 | 1,432.96 |
| S 25 | 13,683.80 | 1,289,021.08 | 0.01062 | 91,708 | 68,781 | 730.16 |

TABLE 5-13 /3 - SECOND STAGE ALLOCATION OF FIXED COST, FROM MOLD DEPARTMENT TO THE MOLD S18, AND S25, BASED ON TOTAL DIRECT COST -YTD

Assumption*: Total assigned fixed cost to the MOLD Department is divided 75% into NEW MOLD manufacturing, and 25% into OLD MOLD maintenance, based on machine hours proportion.

TABLE 5-13  ALLOCATION OF FIXED COST OF SUPPORT FUNCTIONS TO THE MOLD BY
THE THIRD COMBINATION OF ALLOCATION BASES

| PRODUCT CATEGORIES | ESTIMATED AREA RATIO | AREA PERCENTAGE | |
|---|---|---|---|
| FITTING & OTHERS | 6018 | % | 50.19 |
| PALLET | 3057 | % | 25.49 |
| PROFILE(door&window) | 2076 | % | 17.31 |
| MOLD | 840 | % | 7.01 |
| TOTAL | 11991 | % | 100 |

TABLE5-14 /1 - ESTIMATED AREA RATIO AND PERCENTAGE OF THE FACTORY

| PRODUCT CATEGORIES (Production Departments) | FIXED COST OF SUPPORT FUNCTIONS | | | | | | | | | | | | | | | | TOTAL ASSIGNED FIXED COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PLANT SERVICE | | Plant Mgr. OFFICE | | MAINTENANCE | | STAT.&DATA | | LAB | | MOLD DESIGN | | ACCOUNTING | | PERSONNEL | | |
| | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | BAHT |
| FITTING & other products | 50.2 | 358357 | 50.2 | 51695.7 | 50.2 | 92851.5 | 50.2 | 57718.5 | 50.2 | 47680.5 | 50.2 | 34129.2 | 50.2 | 106905 | 50.2 | 253460 | 1,002,796 |
| PALLET | 25.5 | 181999 | 25.5 | 26254.7 | 25.5 | 47156.5 | 25.5 | 29313.5 | 25.5 | 24215.5 | 25.5 | 17333.2 | 25.5 | 54293.7 | 25.5 | 128725 | 509,290 |
| DOOR&WINDOW | 17.3 | 123593 | 17.3 | 17829.3 | 17.3 | 32023.5 | 17.3 | 19906.5 | 17.3 | 16444.5 | 17.3 | 11770.8 | 17.3 | 36870.3 | 17.3 | 87415.5 | 345,854 |
| MOLD | 7.01 | 50051.4 | 7.01 | 7220.3 | 7.01 | 12968.5 | 7.01 | 8061.5 | 7.01 | 6659.5 | 7.01 | 4766.8 | 7.01 | 14931.3 | 7.01 | 35400.5 | 140,060 |
| TOTAL | 100 | 714000 | 100 | 103000 | 100 | 185000 | 100 | 115000 | 100 | 95000 | 100 | 68000 | 100 | 213000 | 100 | 505000 | 1,998,000 |

TABLE 5-14 /2 - FIRST STAGE ALLOCATION OF FIXED COST, FROM 8 SUPPORT FUNCTIONS TO PRODUCTION DEPARTMENTS, BASED ON AREA (PERCENTAGE)

Assumption: Based on Area ratio, every molds (new and old) which are operated in the mold shop within the month should be allocated the same cost.

SECOND STAGE ALLOCATION: BASED ON NUMBER OF MOLD

From machining record in Nov., there are 32 molds manufactured in this month.

Therefore, the assigned fixed cost for a mold is:     140,060 / 32     = 4,376.87 BAHT

So,  fixed cost from support functions assigned to the mold S 18 = S25 = 4.376.87  BAHT

TABLE 5-14  ALLOCATION OF FIXED COST OF SUPPORT FUNCTIONS TO THE MOLD BY

THE FOURTH COMBINATION OF ALLOCATION BASES

| PRODUCT CATEGORIES | ESTIMATED MAN POWER | MAN POWER PERCENTAGE | |
|---|---|---|---|
| FITTING & OTHER | 29 | % | 44.62 |
| PALLET | 4 | % | 6.15 |
| PROFILE(door&window) | 12 | % | 18.46 |
| MOULD | 20 | % | 30.77 |
| TOTAL | 65 | % | 100 |

TABLE5-15 /1 - ESTIMATED MAN POWER AND PERCENTAGE OF EACH PRODUCTION DEPARTMENT

| PRODUCT CATEGORIES (Production Departments) | FIXED COST OF SUPPORT FUNCTIONS | | | | | | | | | | | | | | | | TOTAL ASSIGNED FIXED COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PLANT SERVICE | | Plant Mgr. OFFICE | | MAINTENANCE | | STAT.&DATA | | LAB | | MOLD DESIGN | | ACCOUNTING | | PERSONNEL | | |
| | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | % | BAHT | BAHT |
| FITTING & other products | 44.6 | 318587 | 44.6 | 45958.6 | 44.6 | 82547 | 44.6 | 51313 | 44.6 | 42389 | 44.6 | 30341.6 | 44.6 | 95040.6 | 44.6 | 225331 | - 891,508 |
| PALLET | 6.15 | 43911 | 6.15 | 6334.5 | 6.15 | 11377.5 | 6.15 | 7072.5 | 6.15 | 5842.5 | 6.15 | 4182 | 6.15 | 13099.5 | 6.15 | 31057.5 | 122,877 |
| DOOR&WINDOW | 18.5 | 131804 | 18.5 | 19013.8 | 18.5 | 34151 | 18.5 | 21229 | 18.5 | 17537 | 18.5 | 12552.8 | 18.5 | 39319.8 | 18.5 | 93223 | 368,831 |
| MOLD | 30.8 | 219698 | 30.8 | 31693.1 | 30.8 | 56924.5 | 30.8 | 35385.5 | 30.8 | 29231.5 | 30.8 | 20923.6 | 30.8 | 65540.1 | 30.8 | 155389 | 614,785 |
| TOTAL | 100 | 714000 | 100 | 103000 | 100 | 185000 | 100 | 115000 | 100 | 95000 | 100 | 68000 | 100 | 213000 | 100 | 505000 | 1,998,000 |

TABLE 5-15 /2 - FIRST STAGE ALLOCATION OF FIXED COST, FROM 8 SUPPORT FUNCTIONS TO PRODUCTION DEPARTMENTS, BASED ON MAN POWER (PERCENTAGE)

| MOLD NAME | TOTAL MACHINE HOURS USED IN A MONTH (TABLE 6-4) | | | TOTAL ASSIGNED FIXED-COST TO MOLD DEPARTMENT* (TABLE5-15/2) | ASSIGNED FIXED COST TO A MOLD (BAHT) |
|---|---|---|---|---|---|
| | MOLD | SUM (all molds) | RATIO (MOLD/SUM) | | |
| S 18 | 173.75 | 2,292.94 | 0.07578 | 614,785 | 46,585.97 |
| S 25 | 45.70 | 2,292.94 | 0.01993 | 614,785 | 12,253.11 |

TABLE 5-15 /3 - SECOND STAGE ALLOCATION OF FIXED COST, FROM MOLD DEPARTMENT TO THE MOLD S18, AND S25, BASED ON MACHINE HOURS

Assumption*: the information of machine hours already includes both new molds produced and old molds repaired, thus no need to devide the department's

assigned fixed cost into 2 parts by estimated percentage(75:25)

TABLE 5-15  ALLOCATION OF FIXED COST OF SUPPORT FUNCTIONS TO THE MOLD BY

THE FIFTH COMBINATION OF ALLOCATION BASES

### 5.2.3.3 Comparing on result of five methods of allocation, of Fixed cost of support functions.

The fixed cost of support functions allocated from the existing system and traditional calculation methods in Table 5-11 to 5-15 were concluded and compared in the Table5-16 below.

| METHODS | FIRST STAGE ALLOCATION BASE | SECOND STAGE ALLOCATION BASE | ALLOCATION RESULT(Baht) | |
| --- | --- | --- | --- | --- |
| | | | mold S 18 | mold S 25 |
| 1.Existing | Weighted Average percentage of service | None | 0 | 0 |
| 2.Table 5-11 | Weighted Average percentage of service | Total Direct Cost-YTD | 5,307.27 | 2,704.28 |
| 3.Table 5-12 | Estimated percentages of services | Machine hours | 18,099.12 | 4,760.46 |
| 4.Table 5-13 | Estimated Sales ratio | Total Direct Cost-YTD | 1,432.96 | 730.16 |
| 5.Table 5-14 | Area ratio | Spread evenly throughout every mold | 4,376.87 | 4,376.87 |
| 6.Table 5-15 | Estimated man power ratio | Machine hours | 46,585.97 | 12,253.11 |

**Table 5-16  Comparison of results between traditional methods used to allocate Fixed Cost of Support Functions to the molds**