

# Gudeng Precision—Swatting a Fly with a Sledgehammer, Who Should Bear the Cost?

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## Case

### 1. Industrial Background

Gartner, the international research and consultancy firm, estimates that the growth trend worldwide for expenditure on semiconductor capital equipment can be maintained. Bob Johnson, vice president of Gartner Research, said that capital expenditure in 2013 exceeded wafer equipment (WFE) spending but it is a different scenario for 2014. The total volume of capital spending will grow by 5.7%. This is because the budgets for building up the plans for new WFE plants are reduced. Manufacturers are shifting their focus toward enhancement of their productivity and WFE spending will grow by 16%. In the long run, before 2015, the growth trend will be maintained. Although it is expected there will be a slight slip in 2016, growth will be maintained upward until 2018.

### 2. Company Profile

The Gudeng Precision Company started its business from a mold factory, the traditional method of production, taking a place in the global semiconductor supply chain with the help of its key professional technologies. Gudeng Precision shapes itself as the “Protector of Key Resources and Material”, and has positioned itself as an “Integration Service Provider for the Innovation of Global Key Materials”, focusing on a niche market. Furthermore, Gudeng Precision has developed a unique innovative service model, adopting an innovative model for co-creation. By executing a differentiation strategy, it integrates upstream and downstream customers and suppliers, and has created a service platform with flexibility and efficiency. Consequently, its products are featured as “high-margin, high-price”.

The main functions of the main products of Gudeng Precision are illustrated as follows:

- (1) Photomask carrier solution - vehicles, such as the photomask transfer box
- (2) Machine equipment, such as the photomask cleaning machine.
- (3) WFE carrier solution - vehicles, such as the WFE transfer box.
- (4) Recovery or offer of cleaning and maintenance services for photomask boxes, photomask transfer boxes, and machine equipment for clients.

The sales of Gudeng Precision are mainly attributed to the WFE foundry and integrated device manufacturers (IDM). The main clients are well-known domestic and foreign listed companies or manufacturers, such as TSMC, Intel Corporation, Global Foundries and Daifuku etc. Gudeng is the only selected manufacturer of international 18-inch semiconductor equipment to international standards. Intel invested in Gudeng and became the biggest foreign investment shareholder with 9.7% of shares. In addition, Gudeng is also the supplier of EUV photomask boxes to Escobar Moore (ASML), the leading global semiconductor lithography plant and the partner for exposure machine components (see Figure 1). In 2014, when ASML, the giant lithography equipment maker moved its planning and measuring system (Yield Start equipment) to Taiwan, Gudeng became the beneficiary as the founder for the production of components.

### 3. Establishing the Southern Taiwan Science Park (STSP) Plant

Gudeng was the first manufacturer to produce an 18-inch front-opening wafer transfer box (450mm FOU) and an 18-inch multi-functional wafer transfer box (450mm MAC). In the meantime, Gudeng produced the first production line for an 18-inch wafer carrier solution, establishing the STSP plant to respond to future market needs and expand its operational scale, setting up the latest 18-inch wafer dust free room. Gudeng will be ready for the mass production of 10-nm chips with an EUV device in 2016.

### 4. Speaking from the Shipments that Did not Go Well

Due to the impact of the delay in the supply of key equipment in the first quarter of 2014, some high margin orders for the STSP plant failed to attract clients and the overall production and sales fell short of expectations. Consequently, the actual benefits of the STSP plant photomasks and the high-end wafer carrier were not satisfactory.

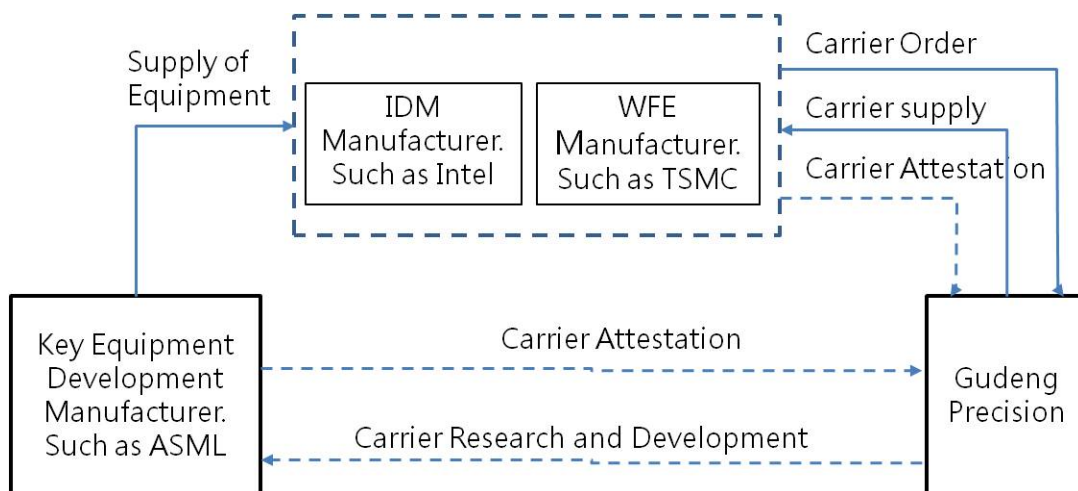
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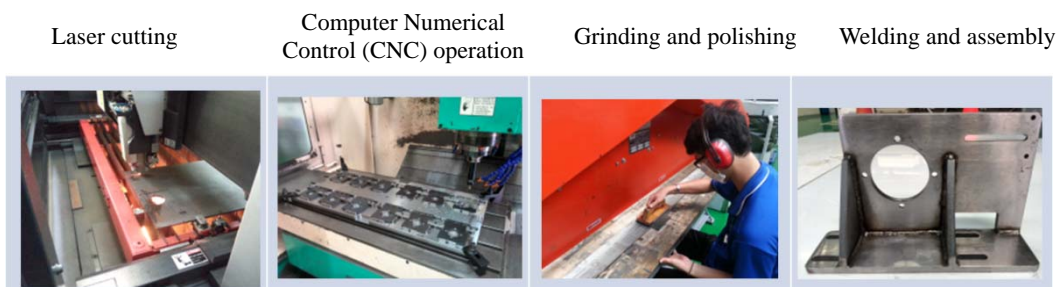
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**Figure 1 Diagram of the Coordinative Creation of Gudeng Precision and its Upstream Manufacturer**



**Figure 2 Schematic Diagram of On-line Motor Bearing Operation**



**Figure 3 Schematic Diagram of Panel Cutting and Motor Bearing Semi-Products**

After discussion with the business department, the general manager believed that the status quo was unsatisfactory and the decision was taken to accept different orders during this transitional period.

Wang Shu-Xian, an employee in the business department, accepted a number of orders for motor bearings.

The main processes are: (1) laser typesetting, (2) laser cutting and (3) CNC operation, from which come the semi-finished products. After grinding and polishing, the finished products are ready. After inspection, the manufacturer outsources the galvanization. Afterwards, following inspection of the appearance, cleaning and packing, these products are stocked and ready for delivery.

The STSP Plant has high-precision equipment, and as a consequence, it is not difficult to produce products following the above processes.

### 5. Occurrence of Losses

Gudeng uses the SAP ERP system and adopts standard cost structures. Each month it carries over the standard cost and actual cost into an analysis of favorable spread, in which the favorable spread refers to when the actual cost is lower than the standard cost; unfavorable cost refers to when the actual cost is higher than the standard cost. The standard costs are the estimated values deemed reasonable and imported to the BOM table of the SAP system by the engineering department.

**Table 1 An Analysis of Spread (TWD)**

|                          |                          |                            |                            |                         |            |
|--------------------------|--------------------------|----------------------------|----------------------------|-------------------------|------------|
| actual material cost     | 200×\$32<br>=\$6,400     | standard material cost     | 168×\$34<br>=\$5,712       | materials cost variance | -\$688     |
| actual direct labor cost | 1,176×\$6.29<br>=\$7,397 | standard direct labor cost | 1,200×\$11.16<br>=\$13,392 | labor cost variance     | \$5,995    |
| actual overhead cost     | 965×\$176<br>=\$169,840  | standard overhead cost     | 1200×\$20<br>=\$24,000     | overhead cost variance  | -\$145,840 |
| total                    | \$183,637                | total                      | \$43,104                   | total                   | -\$140,533 |

After having accepted orders in May 2014, the numbers in the financial statements in June consist of the orders for motor bearings. The total unfavorable spread for the whole company in June comes to \$7,350,348 and the total favorable spread comes to \$2,118,699. Therefore, the total unfavorable spread is \$5,231,649. By only counting orders whose unfavorable spread is more than \$8,000, the total number comes to \$7,077,713.

## 6. Different Opinions

Wu-Hong, the accounting manager, had doubts about the financial statements offered by his assistant. After double checking the database, the results were the same and he went to discuss the issue with Wang Shu-Xian immediately.

Wu-Hong, the accounting manager, said that the unfavorable spread for June was too large and the losses came to around 7 million, in which the order with the biggest unfavorable spread was for motor bearings with the amount of 183,594. In June, 200 units were sold. The income was 30,000 but the cost was up to 180,000 and 150,000 was lost. After double checking, there were no calculation errors, so the advice is not to accept orders such as this in the future. However, Shu-Xian believed that there were calculation errors because the cost was less than RMB 100 and it was impossible to lose so much money. The cause for the variance was that the fixed cost was apportioned on this order. He believed that this order was an exception because the order for motor bearings was temporary and the fixed cost should not be apportioned since the machine and operators are sunken costs and the products should be sold at market price, or even lower than the market price, to win orders.

Wu-Hong, the accounting manager, countered and proposed that the SAP system was set up with standards and the rules should be followed. It is impossible to count the fixed cost on this cargo rather than that cargo. With such disagreement, they went together to discuss the issue with the general manager.

## 7. Cost Analyses Based on Different Perspectives

Wu-Hong, the accounting manager, said that there was an issue he needed to discuss with the general manager. Regarding the order for motor bearings, the accounts in June showed that there was a loss of 7 million in total. This order generated limited

revenue but caused substantial losses. This company features high margin/high price products. Usually the unit price for products is several hundred thousand. For motor bearings, the price is just 150, but the more that are sold, the more losses the company shoulders. Wang Shu-Xian requested that the depreciation of the fixed cost should not be taken into account for this order and that there would be no losses in that case. If the accounting can be revised at one's will, why would the company set up an ERP system? Furthermore, the accounting policies cannot be changed at one's will. The accountant needs to check the accounts. Therefore, it is suggested that it is better that the business department should no longer accept orders with losses such as this.

On the other hand, Shu-Xian, from the business department, said that the company should accept such orders at the market price of 150. If other companies can accept such orders, so can this company. After calculation, the cost for the required material and labor for each motor bearing and the cost of outsourcing the galvanization will not exceed 100 giving a margin of over 50. Furthermore, the cost of the machine and operators are sunken costs regardless of the acceptance of this order. Why can this motor bearing order not be taken? As long as the revenue is higher than the variable cost, the company can accept. The company cannot apportion the spare production capacity for all products just because the machines are spare. This company cannot be tied to the ERP system. For different products, there should be different standards. How can it be wrong to accept this order?

## 8. Dangers Hidden in the Details

The general manager asked the accounting manager Wu-Hong to hand in the data for the orders:

Analysis of the unit price variance of order number 1200100942 in June.

- (1) The quantity of products for this order is 200. The average price is \$150 and the actual cost is \$918 (183,594/200), a loss of \$768 each.
- (2) The total actual cost=the quantity of minutes transferred from orders\*(wage ratio (6.29)+ expense ratio (176) (based on the actual cost for one quarter for the departments))
- (3) The total target cost=the predetermined number of minutes set by BOM\*(wage ratio + expense ratio (Apportioning the total annual cost of the STSP Plant))

**Table 2 The Material Costs (TWD)**

|  | Total Actual Cost | Total Target Cost | Variance |
|--|-------------------|-------------------|----------|
| 1102/1201-0018690<br>Production Input - Material Cost<br>1102/1201-0018690 | \$6,400           | \$5,712           | \$688    |
| Outsourcing production input -<br>production cost                          | \$1,860           | \$1,860           | 0        |
| Total  | \$8,260           | \$7,572           | \$ (688) |

**Table 3 The Standard and Actual Wage Ratio for June (TWD)**

|   | Actual Wage Ratio/min | Standard Wage Ratio/min |
|---|-----------------------|-------------------------|
| 1101060203/LABOR<br>Allocated Direct Labor Cost<br>1101060203/LABOR | \$6.29                | \$11.16                 |
| 1101060203/OH<br>Allocated Overhead Cost<br>1101060203/OH           | \$176                 | \$20                    |

- (1) The standard wage ratio=the total wages over the past quarter for the STSP Plant/ actual production time.
- (2) The reason why the actual overhead cost apportionment is high is because the new equipment and production capacity utilization ratio are not high.

- (2) The difference between the standard labor hourly rate and the actual labor hourly rate:

In Order 2.1101060204/LABOR, the standard wage rate for allocated direct labor is 11.16/min, but the actual wage rate is only 6.29/min. The calculation standard for direct labor apportionment is set abnormally.

Suggested solution: ask the IE engineers in the plant why they set the standard like this and the cause of such a difference.

**Table 4 The Sources of Labor Cost Variance (TWD)**

|   | Total Actual Cost | Total Target Cost | Variance |
|---|-------------------|-------------------|----------|
| 1101060203/LABOR<br>Allocated Direct Labor Cost<br>1101060203/LABOR | \$7,396           | \$13,392          | \$5,996  |

- (3) Timesheet problems: the manufacturing process started on May 19th, 2014, and actually ended on June 24th. Therefore, it was counted into the costs for June.

Suggested solution: clearly ask operators on the production lines to report actual working time.

- (4) Timesheet problems: with respect to the actual cost of an order, if “production cost” is not input correctly, 「#N/A」 will appear.

Suggested solution: ask operators on the production lines to input the actual working minutes.

**Table 5 Overhead Cost Variance (TWD)**

|   | Total Actual Cost | Total Target Cost | Variance     |
|---|-------------------|-------------------|--------------|
| 1101060203/OH<br>Allocated Overhead Cost<br>1101060203/OH | \$169,798         | \$24,000          | \$ (145,798) |

- (5) Manufacturing expense variance: among the sources for manufacturing expense variance, the difference between the ultimate goal of the allocated manufacturing expense and the actual cost is too large.

Suggested solution: re-discuss the calculation standard for the apportionment rate of the applied manufacturing expense.

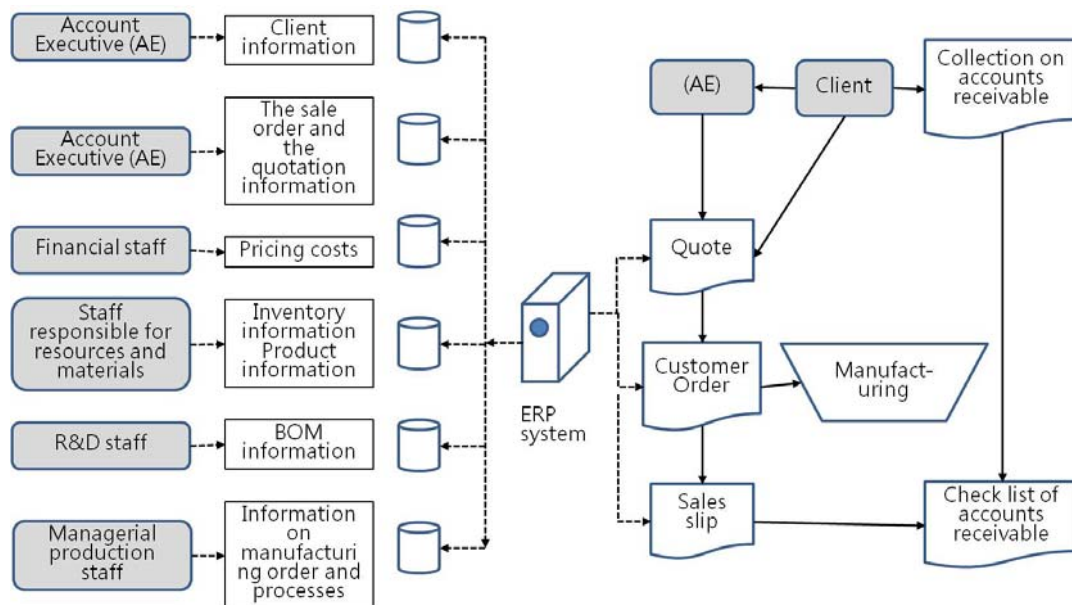
Analysis of unfavorable price variance:

- (1) Problems of information on the materials: the existence of unfavorable material variance. The quantity of products for this order is 200. However, our steel materials are only in two sizes. One size is 4 ft x 8 ft, cutting quantity = 168 PCS, and the other is 5 ft x 10 ft, cutting quantity = 276 PCS.

Suggested solution: establish SOP for production material application, effectively manage the material application on the production lines, and confirm how to record and manage wasted materials after cutting.

## 9. Should We Accept Such Orders in the Future?

Having reviewed the documents offered by Wu-Hong, the accounting manager, general manager Lin took notes in his notebook and compiled several questions: “Regarding the operators on the production line, based on the regulations of the STSP Authority, we cannot dismiss them at our will. Since we hire one, but do not give him work, is this a fixed cost or a



**Figure 4 Schematic Diagram Using the ERP System to Complete the Order Acceptance and Quotation**

Data source: summarized by this study.

variable cost? For purchased equipment, there is various spare production capacity. Does the company need to accept more orders to suffer lower losses? Regarding the spare production capacity, which account should record this cost? Their argument point lies in this transactional period and so is the depreciation of the fixed cost fully apportioned to the motor bearing order? If the fixed overhead cost is \$10,000, the number of working hours for the machines is 10,000 hours / year. If the actual production capacity is 7,000 hours / year, how much should be apportioned? If the actual production capacity is 13,000 hours / year, how much should be apportioned? This is a valid question. Is it a special order? From the perspective of relevance cost, can the company accept this motor bearing order? Manager Wu-Hong was asked to respond to these questions clearly.

“I remembered last time that the accounting department had already calculated the apportionment for the 2N8D model photomask and the motor bearings. The direct material costs are \$96 and \$64, respectively, and the direct labor costs are \$14 and \$86, respectively. The total overhead costs for the photomask and the motor bearings are \$880. If direct labor is adopted to apportion the overhead cost and the cost of the motor bearing, the cost will be \$906, so how can the overhead cost be apportioned? How much apportionment is reasonable? What are the total overhead costs for the materials, labor and costs?

“Can we take the cost variance analysis based on the data of this order from the perspective of material, labor and cost? Manager Wu-Hong requires a better calculation later”.

Can an exception be made for orders whose unfavorable cost variance exceeds \$ 8,000? It is okay

to set up like this for a high price box, but for a low price motor bearing, can this be used as a boundary? The author remembers that the percentage or standard deviation method can be adopted, which is worthy of research.

“Based on these tables, the employees should have received good training”. From the detailed analysis of this order, the problem is not only the amortization of the fixed cost of equipment.

## Teaching Notes

The core of this Gudeng case is whether or not the acceptance of such an order will benefit the value creation of the company? Should the company accept orders like this next time? Facing different solutions, what decision does the general manager make?

The key point can be illustrated in four parts:

### 1. Procedures for the Acceptance of an Order, Pricing, and Cost Analysis

Firstly, there should be familiarity with the procedures of the acceptance of orders, pricing and a cost analysis.

When the enterprise is in operation, the top priorities should be the acceptance of orders, and pricing and cost analysis. Enterprises should gain access to orders and business operations, as long as they understand when they can accept orders with losses; these enterprises can last forever. Due to the importance of the speed and data storage of operational procedures, right now, almost every enterprise is adopting e-

operations and using an ERP system to execute the acceptance of orders and pricing. Regarding the cost analysis of the ERP system, this can be divided into four sections (in order): (1) starting with the opening of an account for overhead costs; (2) the accurateness of tasks; (3) choice of the most appropriate calculation standards; (4) report output planning. Each step can be divided into different tasks.

In practice, the employees of each department will regard the issue from their own perspectives and analyze various situations and influences, compare the actual data with standard KPI value, find out problems and track improvements or solutions, such as an estimate of the execution cost. For the employees in the business department, they can decide whether or not to accept orders based on the relevance between the utilization rate of the machinery and equipment, the profits or losses of the business or use elastic vacation or different depreciation of the machine to calculate the cost so as to enhance the competitiveness of the pricing.

In this case study, if the Gudeng plant accepts the order for motor bearings, the machinery and equipment will have already been depreciated. Without the amortization of the fixed cost of the machine and equipment, the cost for motor bearings will be different.

In addition, Noreen, Brewer, and Garrison (2011) pointed out that variance analysis and performance reports are important factors for the management without exception, which highlights the accountability when the target does not meet its expectations. In this case, regarding the order for motor bearings, during production, there are various scenarios that lead to a variance between standard and real practices. For example, among different material numbers, different steel sizes are adopted. On average, the pricing is different, which causes a material variance. When choosing data from the ERP system, it is necessary to pay attention to the time and cost efficiencies. Not all variances need investigation; the process exploring the significant cost variance is called management by exception.

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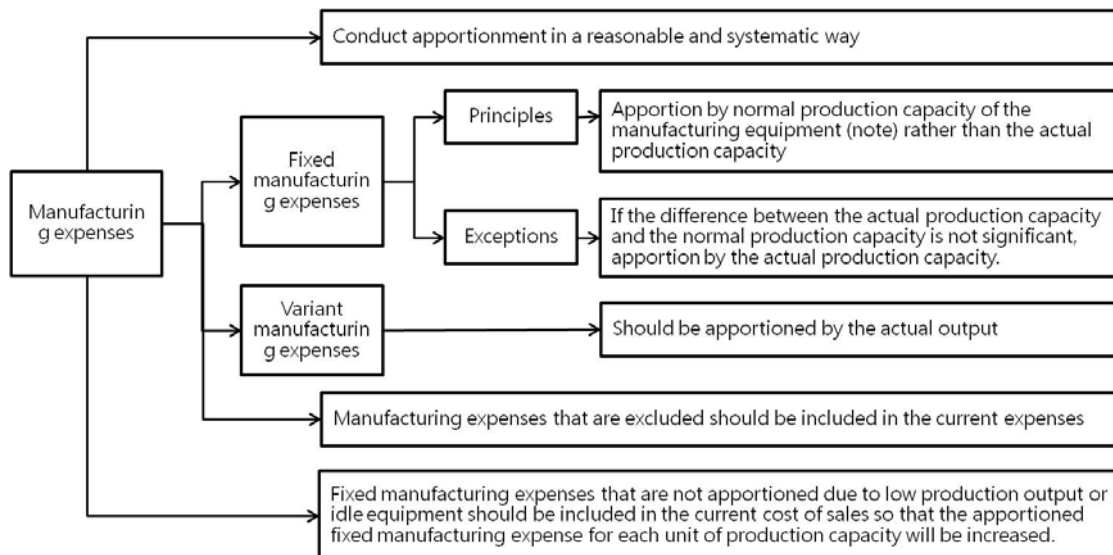
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## **2. Material and Labor Expense Amortization and Cost Variance Analysis**

Secondly, through the related topics regarding the material, labor and cost of three factors of production costs in manufacturing, it is possible to further analyze the amortization of overhead costs, and understand the cost variance analysis for the general model of material variance, labor variance and cost variance, which can be divided into the following points for discussion.

- (1) Is the labor a variable cost or a fixed cost? The difference in the nature of the salary and remuneration costs, the personnel regulations, contract and customers should be valued. Generally speaking, most of the labor costs belong to variable costs. However, in some individual cases, such as the operators of the production line who are protected by the STSP Regulations, they cannot be dismissed at one's will. Because they cannot be fired at any time, except in the short term, the salary of the production line operators, from the perspective of accounting, should be categorized as a fixed cost.
- (2) Which account should be responsible for spare production capacity? Based on the No. 10 of the accounting regulations of the inventory of Financial Accounting Regulations, there are special provisions: due to relatively low output or spare equipment, the unamortized fixed overhead cost should be recorded as the cost of the current goods sold. The amount of the amortization for the fixed overhead costs will not be increased for each unit of output.
- (3) Amortization method of overhead costs. There are three issues for the manufacturing industry: direct material (material cost), direct labor (labor cost), and overhead cost (overhead cost).



Note: normal production capacity refers to the mean production capacity for different periods or seasons in the future as expected by the enterprise, and considering the maintenance.

**Figure 5 Classified Diagram of Manufacturing Overhead**

Data source: Accounting Research and Development Foundation in Taiwan (2008); summarized by this study.

The direct labor and direct material for each product will be counted as the production cost for each product. For the overhead cost, due to the small amount or the wide application of numerous products, it is necessary to find a reasonable and systematic method to amortize the overhead costs for related products. During the calculation of material, labor and overhead costs, the labor and overhead costs are based on the calculation of operation time, output, and cost ratio, from the data of work orders. If there are errors in the operational time, it will directly cause errors in the calculation of direct labor and overhead costs, especially when the errors in the calculation of standard working hours will affect the amortization of actual labor and the overhead costs of the current month and will further affect the ratio of the material, labor and overhead costs for completed products. This is an individual case and one of the reasons for cost variance by financial managers.

- (4) Cost Variance Analysis: this can be divided into five parts
- A. Material variance - material cost variance: Because each material number has a standard cost, after purchase or production, the standard cost will be used for the account. Regarding the actual cost, after comparison with the standard cost, an extraction for incoming material variance or used material variance can be used. The extracted variance is used as an adjustment for the stock cost or sales cost.
  - B. Labor variance -direct labor cost variance: Based on the nature of the cost data, both the standard

cost method (the standards are predetermined in advance) and the actual cost method (the cost is set afterwards) can be adopted as the standard cost method. As a consequence, it is possible to resort to the project design or the historical values of the past. First of all, we should ascertain the labor budget and work out how long the standard working time is for the whole year. In this scenario, it is possible to calculate the standard salary ratio, multiply the standard working hours and obtain the direct labor cost. When the actual execution is carried out, we can ascertain the actual labor cost. The difference between these two is the cost variance.

- C. Cost variance - overhead cost variance: Regarding the amortization ratio for the overhead cost, except for the settings with the help of the machine working time, it is possible to set up cost variance based on the labor cost proportion or manual working time, which is similar to the salary ratio. Because this method adopts pre-determined standards, the amortization amount will not be equal to the actual number. For example, if it is similar to the direct labor cost variance and there are some variances for overhead costs.
- D. Cost variance: this can be quantity variance or price variance. The former refers to the variance of the actual quantity of the input factors and a suitable quantity. This variance multiplies the standard price of the input factor, as shown with the amount. The latter is the result of the multiple of the variance between the actual price and standard price, and the actual purchase



**Table 6 Cost Variance Formula Analysis**

|          | Price Variance<br>(A) – (B) = (D)   | Quantity Variance<br>(B) – (C) = (E)  | Total<br>(D) + (E) = (F) |
|----------|---|---|--------------------------|
| Material | (Actual Unit Price-Standard Unit Price)*Actual Quantity=Direct Material Price Variance                  | (Actual Quantity-Standard Quantity)*Actual Unit Price=Direct Material Quantity Variance                 | Raw Material Variance    |
|          | $(32 - 34) \times 200 = -400$   | $(200 - 168) \times 34 = 1,088$   | 688(U)                   |
| Labor    | (Actual Salary Ratio-Standard Standard Ratio)*Actual Working Hours=The Salary Ratio Variance of workers | (Actual Working hours-standard working hours)*standard salary ratio=Efficiency Variance of workers      | Labor Cost Variance      |
|          | $(6.29 - 11.16) \times 1,176 = -5,727$  | $(1,176 - 1200) \times 11.16 = -268$  | -5,995(F)                |
| Cost     | (Actual Cost Ratio-Standard Cost Ratio)*Actual Working Hours=Changing Overhead Cost Ratio Variance      | (Actual working hours-standard working hours)*standard ratio=changing overhead cost efficiency variance | Overhead cost variance   |
|          | $(176 - 20) \times 965 = 150,840$   | $(965 - 1,200) \times 20 = -4,700$  | 145,840(U)               |

Sources: Arranged by (Garrison, Noreen, and Brewer 2013) for this study.

amount (Garrison, Noreen, and Brewer 2013). The cost variance analysis in this individual case expands with a general model of cost variance analysis. The calculation data are fully illustrated in table 6. With regards to the order for motor bearings, we can analyze that the main reason for the losses lies in the overhead costs, which are caused by price variance.

- E. Accountability: The focus of the execution variance analysis lies in the causes for the variances in order to confirm the attribution of responsibilities. For example, the purchasing department is responsible for the material price variance and the production department is responsible for the material quantity variance. In this individual case, the main reason for the losses is the overhead cost which is caused by price variance. This part is caused by spare production capacity. Regarding the No. 10 accounting regulations of the inventory of Financial Accounting Regulations, there are special provisions: These are due to relatively low output or spare equipment, and the unamortized fixed overhead costs should be recorded in the cost of the current goods sold. The amount of the amortization of fixed overhead costs will not be increased for each unit of output.

### 3. Material and Labor Expense Amortization and Cost Variance Analysis

Third, we are familiar with the decision makings and discussions related to the cost and value creation through cost analysis.

Value creation is the most important mission for enterprises and one of the key factors for the survival of enterprises. Therefore, it needs cost man-

agement to master any cost competitiveness. During the value creation process, under the scenario of long-term operation goals and fixed investment, the focus on the decisions of managers, in the short run, to be first in the strategic adjustment and cooperation based on the current production capacity, equipment, production and price strategies and the strive for maximum profits. Therefore, managers should carefully analyze data to distinguish the relevant costs to make a decision, especially for long term and short term issues. This will lead to errors for different decisions. A more reasonable way is to offer valuable information through relevance analysis that can help shape better strategies.

The concept of relevance cost can be applied in this individual case as the plant located in Southern Taiwan Science Park (STSP) was impacted by the client due to a delay in key equipment in the first quarter of 2014. This meant that some high margin orders failed to be satisfied before the end of the first quarter due to poor performance. There is spare production capacity for equipment and operators on the production line. Therefore, should the plant accept orders to achieve lower losses? This individual case is one of the best cases for special orders.

The hypothesis of this individual case: There is spare production capacity in organizations and this situation cannot last long. Consequently, we can analyze the position from the perspective of correlation costs. We should pay attention to when we conduct the cost analysis: (1) all variable costs are correlation costs (for instance, variable marketing and sales costs are not correlation costs) and no fixed costs are correlation costs (such as the increase in fixed costs due to extra working hours) As a consequence, correlation costs should not be included; (2) wrong unit cost data could mislead the decision makers.



**Table 7 Calculation of Incremental Net Profit**

|                                  | Per Unit | Total amount (200) |
|----------------------------------|----------|--------------------|
| Sales Revenue                    | \$150    | \$30,000           |
| Cost for the amount increased    |          |                    |
| Variable cost                    |          |                    |
| Direct material                  | \$34     | \$6,800            |
| Direct Labor                     | 0        | 0                  |
| Variable Overhead Cost           | 0        | 0                  |
| Total Variable Cost              | \$34     | \$6,800            |
| Fixed Cost                       | 0        | 0                  |
| Total incremental cost           | \$34     | \$6,800            |
| Net Profit for Incremental Sales | \$116    | \$23,200           |

In order to create value and minimize company losses, Gudeng made use of its current equipment to produce a motor bearing order so as to enhance the utilization of the machines and equipment, and measure the capacity utilization for production efficiency and the amortization of labor costs to further reduce the overall cost. Regardless of production or not, in the short run, the manufacturers have to shoulder the fixed cost. In addition, STSP cannot fire the operators at their will. Therefore, even if there is no motor bearing order, STSP has to pay labor costs (the salary for operators) and cannot save one penny for variable overhead costs and the amortization of related machine and equipment. Therefore, regarding the decision for special orders, Gudeng only considers the incremental cost. The net profit is \$116 per unit and the related incremental net profits are illustrated as follows (in table 7)

Considering the break-even point (BEP), the order for the motor bearings lost money, as the total revenue was smaller than the total cost. In fact, the total revenue for the motor bearing order was larger than the total variable cost ( $TR > TVC$ ). The business profit is positive, and this can be used to offset the total fixed cost (TFC) and decrease the losses. Therefore, accepting the order was a beneficial decision.

In summary, enterprises should give top priority to the pursuit of sustainable business due to changes in the wider environment and should strive for value creation. There have been breakthroughs for the current plight from this order, minimizing the losses and creating better operational value for Gudeng. Therefore, regarding the evaluation of the correlation decisions for the value creation of enterprises, the business department should accept orders such as this next time.

#### **4. Management by Exception**

Finally, with respect to management by exception, Noreen, Brewer, and Garrison (2011) pointed out that variance analysis and performance reports are important factors of management by exception, and highlight the ascriptive responsibility when the target does not meet the expectations. In this case, regarding the order for the motor bearings, during the production, there were various scenarios that lead to a variance between the standard and real practices. For example,

among different material numbers, different steel sizes were adopted. On average, the pricing was different, which caused a material variance. Also, metal plates need to be galvanized. Sometimes, the metal work and galvanizing had been completed, but failed to pass acceptance by the client, and were returned for metal work again. In such circumstances, in order to save the metal plates, the metal work should be redone, and we will adopt outsourcing to complete the galvanizing. As a consequence, this order will have the expense of the second galvanization, which will also cause an abnormal situation. Considering the time and cost benefits, not all variances are worth investigation, and the process exploring the significant cost variance is called management by exception.

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