# ACTIVITY BASED COST

PROBLEM: 1.

The following budgeted information relates to X Ltd. for the forthcoming period.

| | Products | | |
|---|---|---|---|
| | **A** | **B** | **C** |
| Sales and production (units) | 50000 | 40000 | 30000 |
| Selling Price (Rs. per unit) | 45 | 95 | 73 |
| Prime cost (Rs. per unit) | 32 | 84 | 65 |
| Machine department (machine hours per unit) | 2 | 5 | 4 |
| Assembly department (direct labour hours per unit) | 7 | 3 | 2 |

Overheads allocated and apportioned to production departments (including service cost center costs) were to be recovered in product costs as (a) Machine department at Rs.1.20 per machine hour. (b) Assembly department at Rs.0.825 per direct labour hour.

You ascertain that the above overheads could be reanalyzed into cost pools as follows:

| **Cost pool** | **Rs.000** |
|---|---|
| Machining services | 357 |
| Assembly services | 318 |
| Set up costs | 26 |
| Order processing | 156 |
| Purchasing | 84 |

| **Cost driver** | **Quantity for period** |
|---|---|
| Machined hours | 420000 |
| Direct labour hours | 530000 |
| Set ups | 520 |
| Customer orders | 32000 |
| Supplier orders | 11200 |

You have also been provided with the following estimates for the period.

| | **A (000)** | **B (000)** | **C (000)** |
|---|---|---|---|
| Number of set-ups | 120 | 200 | 200 |
| Customer orders | 8000 | 8000 | 16000 |

| | | | |
|---|---|---|---|
| Suppliers orders | 3000 | 4 000 | 4200 |

**REQUIRED**: Prepare and present profit statements using. Conventional absorption costing, and activity – based costing. Comment on why activity-based costing is considered to present a fairer valuation of the product cost per unit.

**SOLUTION:**

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**STATEMENT OF PROFIT UNDER HISTORICAL COSTING METHOD:**

In this problem the company is producing and selling three products A,B and C. We have to ascertain the cost of each product and calculate the profit made. The prime cost for each product and the total of the overheads are given.

Under Historical or Absorption costing basis, the total overheads incurred are separated into machine related and labour related. The Overheads driven by Labour (Assembly) are to be charged to the products on the basis of Labour hours and overheads driven by machines will be charged on the basis of Machine Hours.

**ABSORPTION OF OVERHEADS TO THE PRODUCTS TRADITIONAL (OR) HISTORICAL METHOD**

| MACHINE RELATED COSTS | | |
|---|---|---|
| | Hours | Cost |
| A 50000 x 2 | 100000 x 1.2 | 120000 |
| B 40000 x 5 | 200000 x 1.2 | 240000 |
| C 30000 x 4 | 120000 x 1.2 | 144000 |
| | 420000 | 5,04,000 |

| LABOUR RELATED COSTS | | |
|---|---|---|
| | Hours | Cost |
| A 50000 x 7 | 350000 x 0.825 | 288750 |
| B 40000 x 3 | 120000 x 0.825 | 99000 |

| | | |
|---|---|---|
| C 30000 x 2 | 60000 x 0.825 | 49500 |
| | 5,30,000 | 437250 |

Total cost = Rs. 5, 04,000 + Rs. 4, 37,250 = Rs. 9, 41,250

In the above method, the student should note that the overheads are treated as common overheads (not product specific), which means that even if a product is withdrawn the overheads will still be incurred. It is also possible that overheads attributable to one product may be charged to other products. So, this basis of absorption will naturally be giving misleading conclusions.

**STEP: 3. STATEMENT OF PROFIT BASED ON TRADITIONAL METHOD:**

| **Particular** | **A** | **B** | **C** | **Total** |
|---|---|---|---|---|
| Units | 50000 | 40000 | 30000 | 120000 |
| Sales value (A) | 2250000 | 3800000 | 2190000 | 8240000 |
| Prime cost | 1600000 | 3360000 | 1950000 | 6910000 |
| Machine related cost | 120000 | 240000 | 144000 | 504000 |
| Assembling related cost | 288750 | 99000 | 49500 | 437250 |
| Total cost (B) | 2008750 | 3699000 | 2143500 | 7851250 |
| Profit (A) - (B) | 241250 | 101000 | 46500 | 388750 |

**CONCLUSION:** All the products are profitable.

**STEP: 4. STATEMENT OF PROFIT UNDER ACTIVITY BASED COSTING:**

ABC Approach tries to identify overheads to cost objects namely the products. In the traditional method we have seen only two cost pools namely machine related and labour related but under ABC method, overheads will be collected under number of cost pools and charged to products by using activity cost drivers with a high degree of correlation. Thus, overheads charged to products become avoidable i.e. if a particular product is withdrawn overheads attributable can be saved. Let us continue with the problem.

| **Cost pool** | **Rs.000** | **Cost driver** | **Quantity for period** | **Rate/ Unit** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Machining services | 357 | Machined hours | 420000 | 357000/420000 = 0.85 |
| Assembly services | 318 | Direct labour hours | 530000 | 318000/530000 = 0.60 |
| Set up costs | 26 | Set ups | 520 | 26000/520 = 50.00 |
| Order processing | 156 | Customer orders | 32000 | 156000/32000 = 4.875 |
| Purchasing | 84 | Supplier orders | 11200 | 84000/11200= 7.50 |

**Note:** We have grouped the different overheads by bringing them to the activity cost pools. This can be done only by first identifying the activity cost pools. The second step may be to identify the cost drivers namely by basis of allocation. There should be high-degree of correlation between the cost driver used and the overheads incurred. For example in a dairy farm feed has relationship to Milk production but cleaning the sheds has no correlation.

| **(a) Machine service** | | | **(b) Assembly service** | | |
|---|---|---|---|---|---|
| A | 100000 x 0.85 | 85,000 | A | 350000 x 0. 6 | 2,10,000 |
| B | 200000 x 0.85 | 72,000 | B | 120000 x 0.6 | 72,000 |
| C | 120000 x 0.85 | 1,02,000 | C | 60000 x 0.6 | 36,000 |
| | | 3,57,000 | | | 3,18,000 |
| **(c) Set up costs** | | | **(d) Orders processing customer orders** | | |
| A | 120 x 50 | 6,000 | A | 8000 x 4.875 | 39,000 |
| B | 200 x 50 | 10,000 | B | 8000 x 4.875 | 39,000 |
| C | 200 x 50 | 10,000 | C | 16000 x 4.875 | 78,000 |
| | | 26,000 | | | 1,56,000 |

| **(e) PURCHASING – SUPPLIER ORDERS** | | |
|---|---|---|
| A | 3000 x 7.5 | = 22500 |
| B | 4000 x 7.5 | = 30000 |
| C | 4200 x 7.5 | = 31500 |
| | | 84000 |

**STEP: 5. STATEMENT OF PROFIT USING ACTIVITY BASED COSTING APPROACH**

| **Particular** | **A** | **B** | **C** | **Total** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Units | 5,00,00 | 40,000 | 30,000 | 1,20,000 |
| Sales (A) | 22,50,000 | 38,00,000 | 21,90,000 | 82,40,000 |
| Less: Prime cost | 16,00,000 | 33,60,000 | 19,50,000 | 69,10,000 |
| Machine cost | 85,000 | 1,70,000 | 1,02,000 | 3,57,000 |
| Assembly cost | 2,10,000 | 72,000 | 36,000 | 3,18,000 |
| Setup costs | 6,000 | 10,000 | 10,000 | 26,000 |
| Order processing | 39,000 | 39,000 | 78,000 | 1,56,000 |
| Purchasing | 22,500 | 30,000 | 31,500 | 84,000 |
| Total Cost (B) | 19,62,500 | 36,81,000 | 22,07,500 | 78,51,000 |
| Profit (A) - (B) | 2,87,500 | 1,19,000 | (17,500) | 3,89,000 |

**OBSERVATIONS:**

The Product C is incurring loss of Rs. 17500, which is not revealed under Absorption costing method because overheads relating to product C must have been charged to the other products. Now, by discontinuing C we can expect that the overall profit to increase by Rs. 17500.

**SUMMARY:**

**Under traditional method:**

Overheads are treated as common. The accumulated overheads are segregated into Labour related and machine related. Product costs ascertained using this method are not accurate and the decisions will be misleading.

**Under ABC method:**

Overheads charged are product specific. They are avoidable. In order to link the overheads to the products number of cost pools will be created. The activity cost drivers are chosen scientifically so that there is a high degree of correlation. The Product and profit statements are more accurate and can be used for right decisions.

**PROBLEM: 2.**

ABC Ltd. produces three components X, Y and Z. The profit and Loss budget, for the year ending 31.03.10 are as follows:

**(Rs. in lakhs)**

| Particular | X | Y | Z | TOTAL |
|---|---|---|---|---|
| Sales | 21.0 | 15.0 | 5.0 | 41.0 |
| Materials | 7.5 | 4.0 | 1.0 | 12.5 |
| Labour | 3.0 | 3.0 | 0.5 | 6.5 |

Overheads are absorbed on the basis of labour hours.

The following are the further data regarding cost volume and the cost drivers

| Overheads | Rs. |
|---|---|
| Set-up costs | 50,000 |
| Machine repairs & Maintenance | 7,70,000 |
| Material handling and receiving costs | 5,00,000 |
| Packing | 3,00,000 |
| Production order cost | 3,80,000 |
| | 20,00,000 |

| Particulars | Product | | |
|---|---|---|---|
| | X | Y | Z |
| Selling price per unit | Rs.700 | Rs.750 | Rs. 500 |
| Labour Cost per hour | 100 | 75 | 50 |
| Labour hours per unit | 1 | 2 | 1 |
| Machine hours per unit | 1 | 1 | 2 |
| Number of set-ups | 15 | 10 | 25 |
| Number of receipts | 10 | 15 | 225 |

| | | | |
|---|---|---|---|
| Number of deliveries | 10 | 8 | 22 |
| Number of production orders | 10 | 9 | 19 |

All costs are avoidable. From the above information you are required to: compute the product costs using a traditional volume related costing system based on the assumptions that: All overheads are recovered on the basis of direct labour hrs. (i.e. the Co's product costing system). Prepare statement of profit under both the methods and give your comments.

**SOLUTION:**

**STATEMENT OF PROFIT UNDER ABSORPTION COSTING METHOD:** Under this method, all the overheads are treated as common overheads and charged to products on a predetermined basis (Using Labour hours as per the information given in the problem). The overhead recovery rate is arrived at and then charged to the products as under, Total Budgeted hours = Rs.20,00,000 / 8,000 = Rs.250 per hour

| Total Labour Hours. | | |
|---|---|---|
| X | = 3,000 hours x 250 | = 7.5 lakhs |
| Y | = 4,000 hours x 250 | = 10 lakhs |
| Z | = 1,000 hours x 250 | = 2.5 lakhs |
| Total | = 8,000 Hours | = 20 lakhs |

**Statement of profit based on absorption costing method. (Rs. in lakhs)**

| **Particular** | **X** | **Y** | **Z** | **TOTAL** |
|---|---|---|---|---|
| Sales | 21.0 | 15.0 | 5.0 | 41.0 |
| Materials | 7.5 | 4.0 | 1.0 | 12.5 |
| Labour | 3.0 | 3.0 | 0.5 | 6.5 |
| Overheads | 7.5 | 10.0 | 2.5 | 20.0 |
| Total | 18.0 | 17.0 | 4.0 | 39.0 |
| Profit | 3.0 | (2.0) | 1.0 | 2.0 |

**STATEMENT OF PROFIT BASED ON ACTIVITY BASED COSTING APPROACH**

| | Rs. in lakhs | | | |
|---|---|---|---|---|
| **Particulars** | **X** | **Y** | **Z** | **Total** |
| Sales (a) | 21.00 | 15.00 | 5.00 | 41.00 |
| Less: Materials | 7.50 | 4.00 | 1.00 | 12.50 |
| Labour | 3.00 | 3.00 | 0.50 | 6.50 |
| Overheads: - | 5.40 | 4.30 | 10.50 | 20.00 |
| Total cost (b) | 15.90 | 11.10 | 12.00 | 39.00 |
| Profit (a - b) | 5.10 | 3.90 | (7) | 2.00 |

## Working Notes for Overhead Allocation

| **Activity** | **Cost Drivers** | **Basis** | **Cost pools** | **X** | **Y** | **Z** |
|---|---|---|---|---|---|---|
| Set up cost | Set ups | 15:10:25 | 0.50 | 0.15 | 0.10 | 0.25 |
| Machine repairs* | Machine Hours | 3:2:2 | 7.70 | 3.30 | 2.20 | 2.20 |
| Material handling | Requisitions raised | 10:15:225 | 5.00 | 0.20 | 0.50 | 4.50 |
| Packing | Deliveries | 10:8:22 | 3.00 | 0.75 | 0.60 | 1.65 |
| Production order costs | Orders | 10:9:19 | 3.80 | 1.00 | 0.90 | 1.90 |
| **Total** | | | **20.00** | **5.40** | **4.30** | **10.50** |

**Note:** Machine repairs must be allocated in the ratio of total machine hours (3000:2000:2000)

**OBSERVATIONS:** It is the Product Z which is incurring loss hence, we should discontinue the same. By doing this the overall profit will increase to 9 Lakhs. Had we relied upon Absorption costing method, the company would have ended up making a total loss of Rs. 1.9 Lakhs.

**PROBLEM: 3.**

XYZ Ltd. manufactures four products, namely A, B, C and D using the same plant and process. The following information relates to a production period: (11 Marks)

| Product | A | B | C | D |
|---|---|---|---|---|
| Output in units | 720 | 600 | 480 | 504 |
| Cost per unit: | Rs. | Rs. | Rs. | Rs. |
| Direct Material | 42 | 45 | 40 | 48 |
| Direct labour | 10 | 9 | 7 | 8 |
| Machine hours per unit | 4 hrs. | 3 hrs. | 2 hrs. | 1 hr. |

The four products are similar and are usually produced in production runs of 24 units and sold in batches of 12 units. Using machine hour rate currently absorbs the production overheads. The total overheads incurred by the company for the period is as follows:

| | Rs |
|---|---|
| Machine operation and Maintenance cost | 63,000 |
| Setup costs | 20,000 |
| Store receiving | 15,000 |
| Inspection | 10,000 |
| Material handling and dispatch | 2,592 |

During the period the following cost drivers are to be used for the overhead cost:

| | Cost driver |
|---|---|
| Setup cost | No. of production runs |
| Store receiving | Requisition raised Inspection |
| No. of production runs Material handling and dispatch | Orders executed |

It is also determined that:

- Machine operation and maintenance cost should be apportioned between setup cost, store receiving and inspection activity in 4:3:2.
- Number of requisition raised on store is 50 for each product and the no. of order executed is 192, each order being for a batch of 12 of a product.

**REQUIRED:**

(a) Calculate the total cost of each product, if all overhead costs are absorbed on machine hour rate basis.

(b) Calculate the total cost of each product using activity base costing.

(c) Comment briefly on differences disclosed between overhead traced by present system and those traced by activity based costing. (11 Marks)

**ANSWER**

**(a) Total cost of different products (overhead absorption on Machine hour basis)**

| **Particular** | **A (Rs.)** | **B (Rs.)** | **C (Rs.)** | **D (Rs.)** |
|---|---|---|---|---|
| Direct material | 42 | 45 | 40 | 48 |
| Direct labour | 10 | 09 | 07 | 08 |
| Overhead | 72 | 54 | 36 | 18 |
| Cost of production per unit | 124 | 108 | 83 | 74 |
| Output in unit | 720 | 600 | 480 | 504 |
| Total cost | 89,280 | 64,800 | 39,840 | 37,296 |

Machine hours (720 × 4 + 600 × 3 + 480 × 2 + 504 × 1) = 6,144 hours.

Rate per hour = $\frac{\text{Rs } 1,10,592}{6,144 \text{ hours}}$ = Rs18 per hour.

**(b) Activity based costing system**

| | *Set up* | *Store* | *Inspectio* |
|---|---|---|---|
| Machine operation and maintenance cost Rs 63,000 to be distributed in the ratio of 4: 3: | 28,000 | 21,000 | 14,000 |

| ***Cost*** | ***Rs*** | ***Drivers*** | ***No*** | ***Cost per unit of driver (Rs)*** |
|---|---|---|---|---|
| Set up | 48,000 | Production runs | 96 | 500 |
| Store receiving | 36,000 | Requisitions raised | 200 | 180 |
| Inspection | 24,000 | Production runs | 96 | 250 |
| Material handling | 2,592 | Orders | 192 | 13.50 |

Production Run for A (720/24) = 30; B (600/24) = 25; C (480/24) = 20; D (504/24) = 21.

| | | *A (Rs)* | *B(Rs0* | *C(Rs)* | *D(Rs)* |
|---|---|---|---|---|---|
| | Direct material | 30,240 | 27,000 | 19,200 | 24,192 |
| | Direct labour | 7,200 | 5,400 | 3,360 | 4,032 |
| | Setup | 15,000 | 12,500 | 10,000 | 10,500 |
| | Store receiving | 9,000 | 9,000 | 9,000 | 9,000 |
| | Inspection | 7,500 | 6,250 | 5,000 | 5,250 |
| | Material handling and dispatch | 810 | 675 | 540 | 567 |
| | Total cost | 69,750 | 60,825 | 47,100 | 53,541 |
| | Per unit cost | 96.875 | 101.375 | 98.125 | 106.23 |
| **(c)** | | | | | |
| | Cost per unit (a) | *A* | *B* | *C* | *D* |
| | | 124 | 108 | 83 | 74 |
| | Cost per unit (b) | 96.88 | 101.38 | 98.13 | 106.23 |
| | Difference | (27.12) | (6.62) | 15.13 | 32.2 |

The total overheads which are spread over the four products have been apportioned on different bases, causing the product cost to differ substantially: in respect of product A and D a change from traditional machine hour rate to an activity system may have effect on price and profits to the extent that pricing is based on cost plus approach.

## PROBLEM:4.

Explain the concept of activity based costing. How ABC system supports corporate strategy?

## ANSWER

ABC is an accounting methodology that assigns costs to activities rather than products and services. This enables resources and overhead costs to be more accurately assigned to products and services that consume them when compared to traditional methods where either labour or machine hrs are considered as absorption basis over cost centres. In order to correctly associate costs with products and services, ABC assigns cost to activities based on their resources . It then assigns cost to 'Cost objects', such as

products and customers, based on their use of activities. ABC can track the flow of activities in organization by creating a link between the activity and the cost objects.

ABC supports corporate strategy in many ways such as:

- ABC system can effectively support the management by furnishing data, at the operational level and strategic level. Accurate product costing will help the management to compare the profits of various customers, product lines and to decide on price strategy etc.

- Information generated by ABC system can also encourage management to redesign the products.

- ABC system can change the method of evaluation of new process technologies, to reduce setup times, rationalization of plant lay out in order to reduce or lower material handling cost, improve quality etc.

- ABC system will report on the resource spending.

- ABC analysis helps managers' focus their attention and energy on improving activities and the actions allow the insights from ABC to be translated into increased profits.

- Performance base accurate feedback can be provided to cost centre managers.

- Accurate information on product costs enables better decisions to be made on pricing, marketing, product design and product mix.

**PROBLEM:5.**

Give two examples for each of the following categories in activity based costing:

(i) Unit level activities
(ii) Batch level activities
(iii) Product level activities
(iv) Facility level activities.

**ANSWER**

*Examples:*

| | | |
|---|---|---|
| (i) | Unit level activities | 1. Use of indirect materials<br>2. Inspection or testing of every item produced or say every $100^{th}$ item produced<br>3. Indirect consumables |
| (ii) | Batch level activities | 1. Material ordering<br>2. Machine set up costs<br>3. Inspection of products – like first item of every batch |
| (iii) | Product level | 1. Designing the product<br>2. Producing parts to a certain specification<br>3. Advertising costs, if advertisement is for individual products |
| (iv) | Facility level | 1. Maintenance of buildings<br>2. Plant security<br>3. Production manager's salaries<br>4. Advertising campaigns promoting the company |

# JUST IN TIME CONCEPT

## JUST IN TIME PURCHASE

- It is a concept of NIL inventories introduced in Japan in the 1970's mainly to overcome critical shortage of space. The system has the following features.
- The marketing department asks for further supplies only when the existing stock is disposed off.
- The production department asks for further materials only when current processing is nearest completion.
- The materials department arranges fresh supply only when the current supplies are taken up for production.
- The control cards used for this purpose are called kanban, which means visual control. This system has been successfully adopted in Japan, Germany, USA and Korea with a cost reduction of over 35%.
- But this system is yet to succeed in India, because of lack of appreciation of value of time. The JIT system is also called pull scheduling as the entire planning is pulled from the market.
- The conventional method of planning starting with the date of availability of material is called Push scheduling.
- Successful implementation of just in time programme results in following benefits
- Reduction in space requirement and capital investment.
- Reduction in manpower.
- Reduction in carrying cost and working capital.
- Elimination of wastage in storage.
- The system has a built in production schedule. The personnel are on their toes all the time, which acts as a motivating factor.
- Obsolescence does not affect this system very much.

## JIT PURCHASING

PROBLEM:1.

The management of Alliance Enterprises recently decided to adopt a just-in-time inventory policy to curb steadily rising costs and free up cash for purposes of investment. The company anticipates that inventory will decrease from Rs.36, 00,000 to Rs.6, 00,000, with the released funds to be invested at a 12 percent return for the firm. Additional data follow:

- Reduced inventories should produce savings in insurance and property taxes of Rs.27,000,
- Alliance will lease 75% of an existing warehouse to another firm for Rs.2 per square foot. The warehouse has 30,000 square feet.
- Because of the need to handle an increased number of small shipments from suppliers, Alliance will remodel production and receiving-dock facilities at a cost of Rs.6,00,000. The construction costs will be depreciated over a 10-year life.
- A shift in suppliers is expected to result in the purchase and use of more expensive raw materials. However, these materials should give rise to fewer warranty and repair problems after Alliance's finished product is sold, resulting in a net savings for the firm of Rs.25,000.
- Three employees who currently earn Rs.30,000 each will be directly affected by the just-in-time adoption decision. Two employees will be transferred to other positions with Alliance; one will be terminated.
- Reduced raw material inventory levels and accompanying stock outs will cost Alliance Rs.70,000.

**SOLUTION:**

## JUST IN TIME PURCHASE
## CALCULATION OF FINANCIAL IMPACT OF JIT IN ALLIANCE ENTERPRISES

| **Particulars** | **Calculation** | **Amount (Rs.)** |
|---|---|---|
| (i) Interest on Investment of Released funds | (36,00,000 – 6,00,000) x 12% | 3,60,000 (+) |
| (ii) Savings in Insurance & Property taxes | | 27,000 (+) |
| (iii) Rent from ware house | 30,000 sq. ft x 75% x 2Rs./sq.ft | 45,000 (+) |
| (iv) Interest on cost of Remoulding Production & Receiving dock facilities | 6,00,000 x 12% | 72,000 (-) |
| (v) Depreciation on Remoulded Production & Receiving dock facilities | 6,00,000 / 10 years | 60,000 (-) |
| (vi) Savings in warranty & repair problem | | 25,000 (+) |
| (vii) Savings in salary | 30,000 x 3 | 90,000 (+) |
| (viii) Stock out cost | | 70,000 (-) |
| Net financial Impact | | 3,45,000 |

**PROBLEM:2.**

Steel Tech Ltd., is an automotive supplier that uses automatic screw machines to manufacture precision parts from steel bars, Steel Tech's inventory of raw steel averages Rs.6,00,000 with a turnover rate of four times per year, John Mercedes, president of SteelTech, is concerned about the costs of carrying inventory. He is considering the adoption of just-in-time inventory procedures in order to eliminate the need to carry any raw steel inventory. He is considering

the adoption of just-in-time inventory procedures in order to eliminate the need to carry any raw steel inventory.

Mercedes has asked Katrina Gorman, SteelTech's controller, to evaluate the feasibility of JIT for the corporation. Gorman has identified the following effects of adoption JIT. Without scheduling any overtime, lost sales due to stock outs would increase by 35,000 units per year. However, by incurring overtime premiums of Rs.40,000 per year, he increase in lost sales could be reduced to 20,000 units. This would be the maximum amount of overtime that would be feasible for SteelTech.

Two warehouses presently used for steel bar storage would no longer be needed. SteelTech rents one warehouse from another company at an annual cost of Rs.60,000. The other warehouse is owned by SteelTech and contains 12,000 square feet. Three-fourths of the space in the owned warehouse could be rented out for Rs.1.50 per square foot per year.

Insurance totalling Rs.14,000 per year would be eliminated.

| STEELTECH, INC. | | |
|---|---|---|
| Budgeted Income Statement | | |
| For the Year Ended December 31, 2001 (in thousands) | | |
| Sales (9,00,000 units) | | Rs.10,800 |
| Cost of goods sold: | | |
| Variable | Rs.4,050 | |
| Fixed | 1,450 | 5,500 |
| Gross margin | | Rs.5,300 |
| Selling and administrative expenses: | | |
| Variable | Rs.900 | |
| Fixed | 1,500 | 2,400 |
| Income before interest and income Taxes | | Rs.2,900 |
| Interest expenses | | 900 |
| Income before taxes | | Rs.2,000 |

Steel Tech's projected operating results for 2001 are as follows. Long-term capital investments by Steel Tech are expected to produce a rate of return of 20 percent before taxes.

**REQUIRED:** Calculate the estimated savings or loss for Steel Tech, Ltd. that would result in 2001 from the adoption of just-in-time inventory methods. Ignore income taxes, (Hint: Try to estimate the costs and benefits associated with the JIT decision. Begin by computing the forgone contribution margin on the lost sales. The contribution margin is the sales revenue minus the variable cost.

## SOLUTION:

### CALCULATION OF ESTIMATED SAVINGS / (LOSS) FOR STEELTECH LTD.

| **Particulars** | **Calculation** | **Amount (Rs.)** |
|---|---|---|
| (i) Over time premiums on account of stock outs | | 40,000 (-) |
| (ii) Savings in warehouse rentals to be paid to outsiders | | 60,000 (+) |
| (iii) Rental Income on account of letting out ware house | (12,000 sq. ft x ¾ × Rs. 1.50 per sq. ft ) | 13,500 (+) |
| (iv) Savings in Insurance | | 14,000 (+) |
| (v) Savings in fund invested | (6,00,000 × 20%) | 1,20,000 (+) |
| (vi) Loss of sales | (Refer working note – 1) | 1,30,000 (-) |
| Net Financial Impact | | 37,500 (+) |

## WORKING NOTE:

| | 2001 | % |
|---|---|---|
| Sales | 10,800 | 100% |
| (-) Variable Cost<br>Cost of goods sold<br>Selling & Administration Expenses(4950 / 10800) x 100 | 4050<br><br>900<br>= 4,950 | 46% |
| Contribution (5850/ 10800) x 100 | 5,850 | 54% |

## CALCULATION OF LOSS ON SALES

| | |
|---|---|
| Sales (20,000 x 12) | 2,40,000 |
| (-) Variable Cost (20,000 x 5.5) | 1,10,000 |
| Contribution lost | 1,30,000 |

## ADVANTAGES DERIVED BY INDUSTRY USING JIT SYSTEM

Companies which have installed JIT system experience high inventory turnover ratio, for example the Toyota reached a turnover of 70 times per annum as against the two to ten times experienced by the companies traditional manufacturing system.

- Summary: It is a concept of NIL inventories introduced in Japan in the 1970's mainly to overcome critical shortage of space.
- The system has the following features: The marketing department asks for further supplies only when the existing stock is disposed off: The production department asks for further materials only when current processing is nearing completion. The materials department arranges fresh supply only when the current supplies are taken up for production.
- Successful implementation of just in time programme results in following:
- Reduction in space requirement and capital investment.
- Reduction in manpower.
- Reduction in carrying cost and working capital.
- Elimination of wastage in storage.
- The system has a built in production schedule. The personnel are on their toes all the time, which acts as a motivating factor.
- Obsolescence does not affect this system very much.

### IMPACT OF JIT ON PRODUCT PRICES – SUMMARY AND OVERVIEW

The operation of a compete JIT system can be understood in the following stages.

- **PREPARATION OF PRODUCTION SCHEDULE:** The Company should ensure that it receives the spare parts, components and raw materials from the suppliers at the right time for the manufacturing purposes. Naturally the company must first prepare production schedule for products/jobs and prepare a bill of materials, which should give list of items and quantities required and the exact time.

- **ROLE OF PURCHASE DEPARTMENT:** The purchase department must start investigating and evaluating the suppliers who can keep up to delivery dates supplying right quality and quantity. Since the deliverers are sent straight to the production flow for immediate use without any quality check, it is imperative to keep the engineering staff of the company at the suppliers factory so that they can monitor the quality right at the production stage and also help the supplier conform to the high quality standards.

- **PERFECT COORDINATION BETWEEN SUPPLIER AND PURCHASE DEPARTMENT:** Since the object of the JIT is to maintain zero inventories, there should be a clear cut understanding between the company and the supplier with regard to the items that are required and should be clearly informed to them, so as to ensure that the deliveries are dropped right at the machines that will require them first while in case of many companies the set up takes long time. In order to reduce the costs in particular the set up costs, the company ensures long production runs, To achieve this the many products are made at one time resulting in high inventory carrying cost, defective output, losses on account of product obsolescence.

- **REDUCTION OF IN PROCESS STOCKS AND WASTAGE:** JIT system tries to solve the above problem by making use of a video tape of a typical set up, which will be examined by a team of industrial engineers who spot and gradually eliminate steps that contribute to the lengthy set up and after a number of iterations the time required will be drastically reduced some times to minutes and seconds down from lengthy hours. As a result of which the amount of work in process as well as quantity and type of products

are reduced and the products are produced without defects, thereby reducing scrap costs.

- **EASY IDENTIFICATION OF DEFECTIVE PRODUCTION – KANBAN CARD AND PULL SCHEDULING:** The next important stage aims at a smooth and streamlined flow of parts from machine to machine. In many companies the work in process builds up in front of machine working with slow speed as they are produced from the other process having machines operating at a higher speed. This will make it difficult to identify the defective parts, at that stage of processing and since the defective parts pass through other processes resulting in, far greater losses, when the defectives are scarped. In order to solve this problem the companies use KANBAN Card which means visual control. This system has been successfully adopted in Japan, Germany, USA and KOREA with a cost reduction of over 35%. But this system is yet to succeed in India, because of lack of appreciation of value of time.

- The JIT system is also called as Pull scheduling because the entire planning is pulled from the market. The conventional method of planning starting with the date of availability of materials is called Push scheduling. The object of the above is to ensure that work in process inventory is not built up in the production system, because when a machine in the first process produces parts and sends it to other machines in the next stage of operations.

- The KANBAN card system will authorise sufficient parts to be produced to full fill the requirement of the feeder machines in the further stages. Another way to reduce the excess WIP and defective parts is to group machines in to work in cells. A cell is a small cluster of machines which can run by a single operator. He will be taking output from one machine to other within the same cell and the operator can also identify defective output at every machine. Such configuration will have lower maintenance costs since the small machines are simpler than the large and automatic ones.

- Both KANBAN and Machine cells should be used together, this concept has vastly reduced the build up of work in process inventory and almost eliminates the defects in the output. In this system the worker is properly

trained to handle operating the different machines and also maintain them in a limited way, will involve himself, as he understands flow of the entire system.

- In other words to change over to this system from the traditional approach of one employee to maintaining one machine to one employee maintaining several smaller machines.

- **PROPER TRAINING OF WORK FORCE:** To achieve this work force must be completely retrained and focussed on a wide range of activities. Now this approach shifts the focus of the management from aiming high production volumes, (2) the performance based on high product quality. The work force is empowered to stop the machines on locating any problem solve it immediately or call in a repair team resulting in a immediate solution to the problems.

- **SIMPLIFICATION OF ACCOUNTING PROCEDURES:** In order to avoid accounting problems, the accountants can prepare a single consolidated monthly payment to each supplier instead of handling large pile of paper work in the traditional system.

- In fact the quantities supplied by the supplier for which bill is settled for easily be cross verify by determining the quantity of finished products produced during the period, for example during the particular month 1,000 parts of product A are produced, product A requires 2 Kgs of raw material X, and three units component Y. X is supplied by Ram and Y by Laxman so the company can pay Ram for 2,000 Kgs. of X and Laxman 3,000 units of Y. This approach is also eliminates the need for supplier sending invoices as the company relies on production records.

- **MACHINE UTILIZATION:** In the traditional system where the company invests a large amount on assets with high automation, the key measurement will be high machine utilisation, resulting in piling of the inventories in the ware house, Whereas under JIT system creating machine cells tend to be less costly and need not be heavily utilised. In other words the machine utilisation is not the key measurement.

- In the traditional system the employees get extra wages for producing more quantity in a given time, which means a lot of accounting work goes in maintaining time keeping and time booking records which is totally eliminated in this system.
- **AVOIDING INCENTIVES FOR EXCESS PRODUCTION:** In the traditional system the employees will be paid bonus if they achieve or exceed the targets in volume, whereas the JIT focuses on producing what is needed, hence the piece rate systems are eliminated. Importance is given to the quality of the output or the number of employees' suggestions for improving the system rather than producing volumes resulting in piling up of the inventories.
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