



ACTIVITY BASED COSTING IN FOUNDRIES THROUGH AN ERP SOFTWARE

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SYNOPSIS

Traditional cost accounting system allocates indirect overhead costs arbitrarily to products, resulting in distorted cost picture. Hence it is difficult to answer the question – which of our products/ customers are profitable and which are not? Activity Based Costing (ABC) resolves this problem by tracing overheads and converting them to direct costs through cost drivers. In reality, this methodology poses major obstacles in implementation. Unless the entire process is fully automated, concept of ABC in foundries is difficult to be realized in practice. This paper describes the use of ABC module of an ERP to address this problem in a non-ferrous foundry. The software allows individual manufacturer to select and set the cost drivers and customize the ERP for their operations. Resulting ABC of the products provided new insights which enabled management to analyze the variances compared to the selling price and take corrective actions.

It is also proposed to use ABC for activity based management (ABM) and cost modeling enhancing the utility of this ERP as a strategic tool.

KEYWORDS

Traditional Cost Accounting (TCA), Activity Based Costing (ABC), Cost Drivers, Product Cost, Batch Cost, Overhead Cost, Indirect Cost, ERP

INTRODUCTION

Traditional costing system (TCS) allocates overhead costs of an enterprise on products arbitrarily on the basis of some volumetric measures such as the labour hours or tonnage. This methodology was appropriate when the overheads costs were low in comparison to other costs. In the current scenario in foundries and other manufacturing industries, indirect/ overhead costs are increasingly becoming a significant part of the total costs. Allocating these costs to products in an ad-hoc manner distorts the final cost of products and when manufacturing economics are analysed at product/ customer levels, TCA gives a misleading picture.

As a result, foundry management at strategic levels is unable to answer the following questions:

- Some of our products/ customers are profitable and some are not; do we know which are profitable and which are not?

- Do our costs erode our profits unduly? – Unless costs incurred by foundry add value to the customer, he may not agree to pay a price for it. In such a case, costs may not be justified enough both from the angle of customers and margins.

Activity Based Costing (ABC) was developed to resolve some fundamental inadequacies of TCS in the late 1980s. It allocated indirect costs by a more accurate cost management methodology based on the principle that overhead costs result from the use of resources to perform services, mostly oriented to customers and products. ABC principles considered following interrelated points:

- Cost objects (products/ services) consume activities
- Activities consume resources
- Resources drive costs

This relationship enables tracing of overhead costs



and converting them to direct costs, without recourse to allocation methodology. ABC extracts indirect costs from the cost pool (generated by TCA methodology) and allocates them to cost objects, based on predetermined cost drivers, resulting in a different but an effective insight into the cost of products of the foundry.

Total cost of a product in a foundry (Direct & Indirect costs) can be driven to the products by one or more of the following methods

1. Direct costs of resources used in a product is captured by direct charges (e.g. Raw Material costs) – This is the most accurate and preferred method of costing. However this is not always feasible.
2. Indirect costs can be traced to each product by means of setting of drivers (e.g. Maintenance and Quality Control Costs, interest on working capital/ long term finance). This is the essence of ABC.
3. Some indirect costs have to be manually assigned to individual products for each transaction (e.g. travel bills for attending to customer complaints, cost of special QC testing for a specific batch, etc.)
4. Balance of the indirect costs can be driven to the products only by allocation methodology, using some volumetric measures such as tonnage, labour hours etc., e.g. Management Costs, etc. This way of computation is TCA and should be used only as a last resort.

Based on these concepts, it was decided to develop real time Activity Based Costs in a copper alloy nonferrous foundry supplying cast and fully machined components to industries. This was pioneered by collaboration between the foundry, a management consultancy firm as well as the ERP software supplier to the foundry

PRACTICAL DIFFICULTIES OF DEVELOPING ABC

In reality, ABC methodology poses following two major obstacles in implementation:

- Deciding & setting the cost drivers
- Processing a large number of transactions, accumulating the data in the general ledger and reallocating costs to products on the basis of preset drivers.

A typical approach will be the use of spread sheet

for allocating overhead costs to products. While each row will represent an item of indirect cost, each of the columns will represent a product. Every indirect cost can be allocated to every product on the basis of preset driver. Many stand-alone ABC packages rely on this methodology.

However, spreadsheet method of determining is extremely tedious, time consuming, error prone and it does not operate in real time. Besides, indirect costs may not have a one-to-one relationship to the products and may require to be driven through several levels. Therefore, concept of ABC for foundries is difficult to realize in practice, unless the entire process is fully automated.

DEVELOPING ABC THROUGH AN ERP

After brain storming sessions between foundry management, consulting organization and software company that supplied the ERP to the foundry, it was decided to modify the existing ERP to generate ABC cost of products in real time. Advantages of this approach are a) Once the drivers are set, product cost data by ABC system is fully automated; routine transaction entries in the ERP are adequate b) No intervention is required except in respect of manually driven cost information such as travel cost or special quality testing c) ABC costing flows in real time to the organization d) Based on the feedback, cost driver setting can be fine tuned and revised costs flow begin to flow without any loss of time or disruption e) Impact of cost reduction activities could be focused and monitored in real time

A detailed road map was drawn up in order to implement ABC costing through the existing ERP. Steps consisted of

1. Assess the detailed cost structure of the foundry, based on both current as well as historic information
2. Identify all the indirect costs as well as cost drivers through which the indirect costs could be apportioned to the product
3. Identify the levels of each of the cost drivers, so that each of the indirect cost could be driven to the product through successive levels of cost drivers.
4. Configure the existing ERP, in order to provide screens to the users to select and set the cost drivers. This should be infinitely customizable, so that cost drivers could be changed, if the feedback indicated such a need.



5. Conduct trial runs, evaluate results and debug
6. Begin to get ABC costs in real time. Compare with the selling price. Analyze and initiate corrective actions
7. Use ABC to build cost models and develop Activity Based Management (ABM)

The first three steps, viz. deciding and setting the drivers for a foundry is a tedious and time consuming work. It required a lot of analysis of past data, study of the organization and business structure, extensive discussions with senior management personnel and considerable policy inputs from the top management. Engaging the services of an external consultant was found to be very useful.

Thereafter existing ERP was reconfigured by the software supplier by extensively modifying the existing ERP in order to incorporate the drivers and make provision for selecting the drivers and driving the costs successively through several levels to the product. ERP Software had to be made flexible so that i) drivers could be modified based on initial feedback and ii) entry screens could be developed that were user friendly.

Implementing this unique concept was possible only due to active collaboration between the foundry, consultant organization and the ERP supplier and due to the unstinted focus by the foundry management, consultant organization and the software company. It took about 6 months of continuous effort to successfully complete this project.

DETAILS OF ABC THROUGH ERP

Product cost consisted of: a) batch related costs b) Overhead cost c) Supporting cost, as explained in detail below.

4.1 Batch related costs: Provision was needed for batch costs (such as raw materials, melting consumables, cutting tools etc.), that would be charged to individual batches/ products, as per the routing shown below. As a result, each of the products included all the direct costs of production (Hitherto, all the consumables were directly charged to "production", but not to a specific batch).

- Raw Materials for castings (less scrap credit) → batch cost/ products
- Hourly Equipment Cost → Cost of Machine /

estimated life of the machine in hours (This is different from the financial provision for depreciation)

- Power Cost 1 (Grid Power) → Electric Bill
- Power Cost 2 (DG set) → (Cost of DG set equipment cost + Cost diesel consumed)
- Final unit power Cost → Power cost 1 + power cost 2/ Total units consumed from the grid + captive generation
- Machine Power Cost → Final unit power cost x equipment power rating x usage factor (duty cycle) x hours run by the equipment
- Repairs & Maintenance → Actual cost of spares & labour for a machine + other costs such as travel for procuring the spares → R & M cost of Machine → Standard hours spent by the batch on the machine → product cost

4.2 Overhead cost/ Support cost: These are the sum of costs accumulated at the cost centres & absorbed by the respective product on the basis of the applicable cost driver. Supporting cost includes packaging material cost, freight cost, working capital cost and other costs incurred by the product.

Typical list of drivers used for driving the indirect costs to batches/ products are listed below:

Shell / Hand Mould Weight, Product Lead Time, Employees for a Department, Executive Head Count, No Of Vouchers, Delivery Notes & Product (Count), Goods Receipt Notes, Invoices & Product (Count), Shop route cards//Batches, Subcontractor Delivery Notes, Machine Production Time/Hours – Actual, Invoice Credit Period – Actual, Raw Material issue Value etc.

Some examples of overhead cost/ support cost converted to direct costs through cost drivers based on ABC methodology have been given below:

- Depreciation on building → Floor area occupied by the machine → Standard hours spent by the batch on the machine → Batches/ product cost
- Quality Department Cost → Department cost based on head count → Products processed by QC in the department → Batches/ product cost
- Working capital interest → Invoices → product cost
- Interest on Letters of credit (purchase) → GRN of



materials purchased → Products using the material for production → product cost

- Sales Administration → Number of Invoices
- Purchase → Number of GRNs → Raw Materials Stores → Batches
- HR → Number of Employees in a department → Work Centre (WC) Cost → Batches, in proportion to the time spent in the WC

Similarly, indirect costs such as travel and conveyance can be specific to a batch, product, work centre, cost centre, product category or customer and therefore needed to be tracked based on the purpose of travel and conveyance. This information is sent to Finance department by individuals concerned in the travel expense voucher.

Special screens (Fig.1, 2) were developed for setting the cost drivers for each element of indirect cost so that they are finally driven to the product. As noted above, there are several levels of hierarchy through which each of the indirect costs needs to be driven. These screens are fully customizable, so that the drivers could be set to suit individual customers.

RESULTS & DISCUSSIONS

Initial results from the ERP indicated that some fine-tuning was needed to set the ABC system in place and validate the results. After this stage, product cost began to flow in real time to the foundry. One such example is given in Fig.4, 5 & 6 which is the result of costing by ABC system, for a particular batch. Similarly, the batch cost of every product manufactured by the foundry is now available from the ERP.

It is evident from the results that a new insight has been provided by the ERP into the foundry costing, through ABC module. A detailed product cost, including identification of source of costs is practically feasible through ABC system. Money spent by the organization finally gets absorbed by the products of the foundry and can be traced through use of ABC system.

Comparing the activity based cost of products with the selling price gave an indication of the products/ customers that were making money or that were losers. Due to historical nature of the current selling price of products, it was not possible to correlate ABC with the current selling price build up of products.

Another interesting result was that the in-house

cost of production was found to be less than the outsourcing cost in some cases, due to administrative expenses associated with this activity. Such a detailed analysis will have strategic implication on “Make or Buy” decision for the foundry.

ABC is an extremely powerful management strategic control tool for monitoring the undistorted cost of the products, as listed below:

1. Once the drivers are validated and set, product cost data by ABC system is fully automated. ABC costing flows in real time to the organization for each batch of each product. No additional data collection effort is required by the foundry to get ABC costs.
2. Cost of smallest element of production – viz. a batch is available to the foundry management.
3. Normally, batches get split and merged during the operations, in a foundry. This ERP is able to trace the cost of batches even when they are not processed together.
4. It helps to sort the products/ customers and assess their contribution to the business. Hence ABC works as a powerful Decision Support System for the foundry. In effect, foundry begins to evaluate the customers’ value for the foundry.
5. Impact of specific Kaizen (operations improvement) & cost reduction activities can be focussed and monitored.

CONCLUSIONS

After a lapse of many years during which foundries’ attention was focussed on opportunities provided by external issues like managing unprecedented business growth and expansion, it is time now for concentrating on internal efficiencies such as elimination of waste, elimination of non value adding activities and weeding out unprofitable customers/ products. ABC costing is an extremely powerful tool that will help foundries in this pursuit.

Such a pioneering work in ABC costing, developed by configuring an existing ERP has become feasible due to the unstinted focus by the foundry management, consultant organization and the software company on this development. It took about 6 months of continuous effort to successfully complete this project

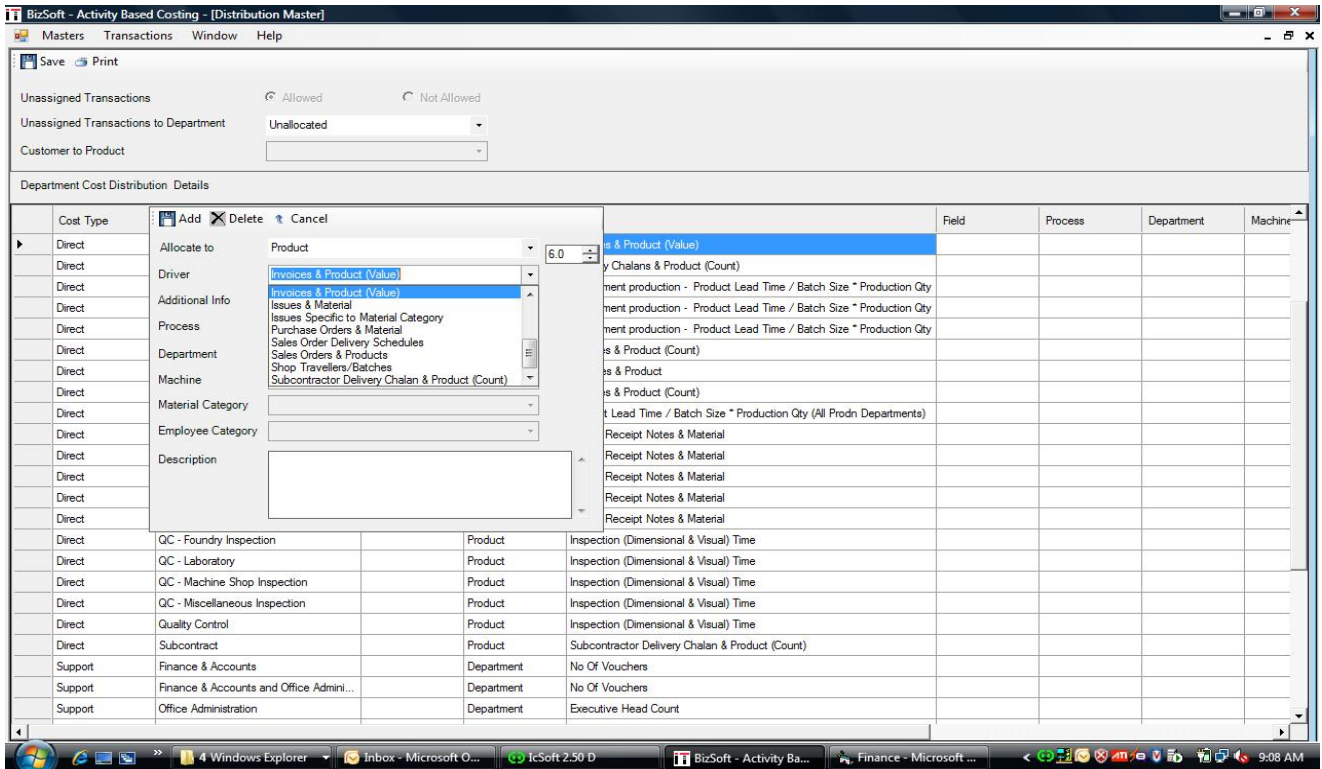


Fig. 1 - Department Driver Setting Screen

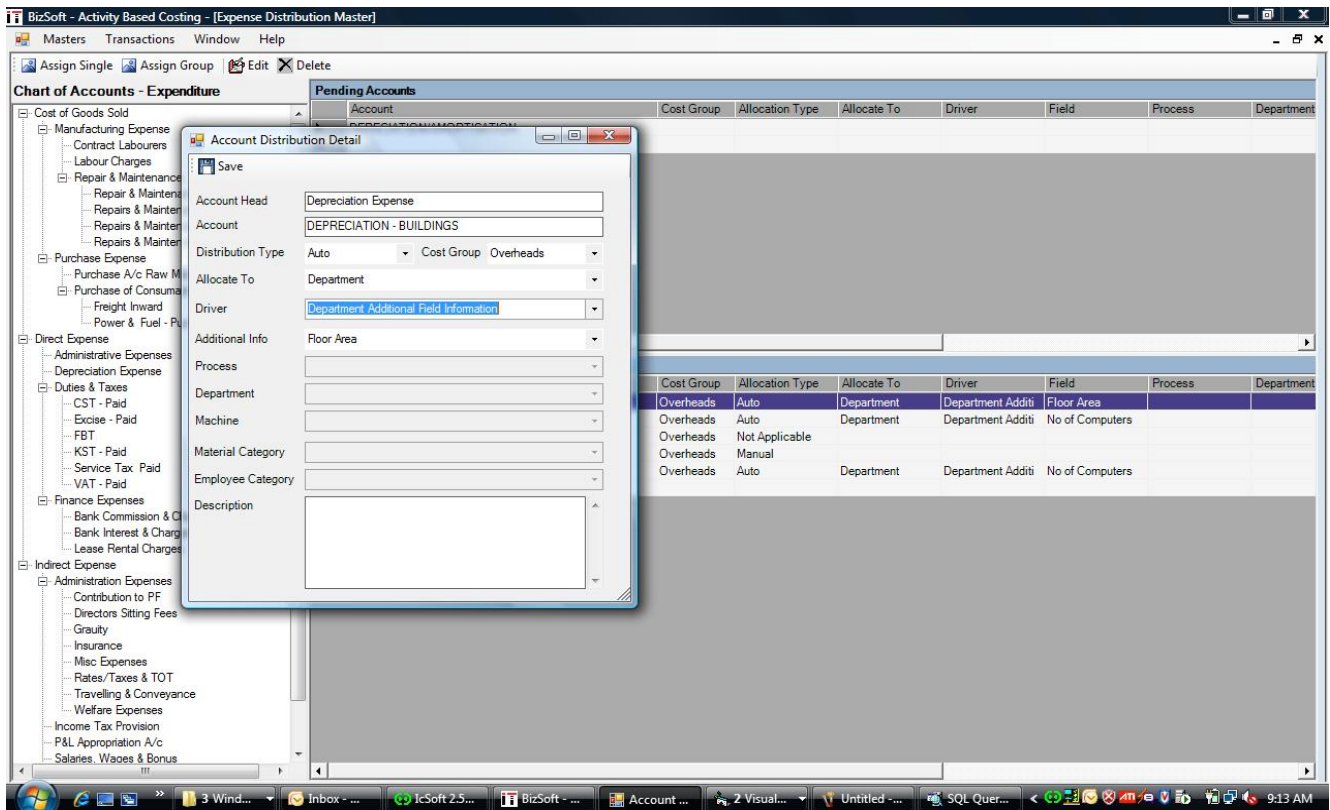


Fig. 2 - Expense Driver Setting



Fig 3 - Details of Direct Cost Per Batch Of 100 Pieces. (Rs.)

Sr. No.	Operation	Raw Material	Work Centre	Utility	Labour (Direct + Indirect)	Sub Contract	Consumables	Tooling	Others	Total Cost
1	Moulding/ Melting/ Pouring	37451.30	215.47	3752.70	196.32	0.00	9.29	219.26	53.93	41898.27
2	Hard Scrap/ swarf Credit	(15379.81)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(15379.81)
3	Fettling	0.00	329.23	61.51	825.57	0.00	9.29	0.00	53.93	1279.53
4	M/C Opr. 1	0.00	19.91	0.00	728.99	0.00	10.21	0.00	21.59	780.70
5	M/C Opr. 2	0.00	86.64	147.08	728.99	0.00	10.21	0.00	21.59	994.51
6	M/C Opr. 3	0.00	19.91	0.00	728.34	0.00	10.13	0.00	21.42	779.80
7	M/C Opr. 4	0.00	19.91	0.00	728.34	0.00	10.13	0.00	21.42	779.80
8	M/C Opr. 5	0.00	201.80	165.60	628.07	0.00	10.13	0.00	21.42	1027.02
9	M/C Opr. 6	0.00	19.91	0.00	728.34	0.00	10.13	0.00	21.41	779.79
10	M/C Opr. 7	0.00	1643.91	723.73	1269.86	0.00	10.13	0.00	21.41	3669.04
11	M/C Opr. 8	0.00	142.76	19.61	728.34	0.00	10.13	0.00	21.41	922.25
12	M/C Opr. 9	0.00	19.91	0.00	728.34	0.00	10.13	0.00	21.41	779.79
13	Subcontract	0.00	0.00	0.00	42.55	650.00	0.00	0.00	0.00	692.55
Total		22071.49	2719.36	4870.23	8062.05	650.00	109.91	219.26	300.94	39003.24

Note:

1. Work Centre Cost consists of Repairs & Maintenance, Preventive Maintenance Cost, Machine consumables such as oils, depreciation costs etc.
2. Utility Cost includes Power cost, cost of water, compressed air etc.

Fig 4 - Details of Indirect Cost Per Batch Of 100 Pieces (Rs.)

SN	Details	Cost	SN	Details	Cost
1	FG Store	31.36	9	Purchase - RM	45.47
2	Marketing	113.23	10	Purchase – Foundry Consumables	49.44
3	Purchase	186.21	11	Purchase – M/C shop Consumables	15.11
4	Corporate	1100.27	12	Purchase - Others	0.73
5	QC	49.99	13	Sales Admin	46.61
6	QC - Foundry	172.99	14	Unallocated	1050.30
7	QC – Machine Shop	299.81	15	Direct Overheads	2309.52
8	QC - Lab	203.54	16	Sub-Contract	117.04
Total					5791.62



SCOPE FOR FURTHER WORK

1. As the cost keeps varying from batch to batch, average or YTD cost of batches needs to be reported by ABC. This increases the computation work and therefore needs to be done at night, when data entry load is low.
2. Based on the ABC, foundry needs to develop cost models on which quotations for new products can be based. Actual costs can be compared on a one to one basis with such a quotation. It is easy to analyse variances by each element and initiate focused cost control measures.
3. Using the data from ERP on costs, foundry needs to carry out existing product mix rationalization i.e. compare the current derived costs vis-à-vis quoted selling price and discontinue less/zero/negative profit products. Use this data to revise and fine tune the existing cost drivers.
4. Quality costs need to be reported in terms of failure (internal & external) cost, prevention cost and appraisal cost

It is proposed to pursue all these activities which will enhance the utility of the ERP to the foundry.

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