

The Research on Cost Management of steel pipe enterprise based on Activity-Based Costing

Haopeng Geng^{1, a}, Shaohua Dong^{2, b} and Hua Zhang^{3, c}

¹ School of Mechanical Engineering University of Science and Technology Beijing, USTB, Beijing, China

² School of Mechanical Engineering University of Science and Technology Beijing, USTB, Beijing, China

³ School of Mechanical Engineering University of Science and Technology Beijing, USTB, Beijing, China

^agenghaopeng1991@163.com, ^bdsh_dle@me.ustb.edu.cn, ^c1317766abc@163.com

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Abstract. In this paper, through analyzing the current cost management process of a steel pipe enterprise, the disadvantages of the method used in the enterprise is pointed out. Cost deviation can be greatly reduced by using Activity-Based Costing. Finally, a cost management system is developed.

Introduction

With the rapid development of science and technology, the production cost structure of the enterprise has changed greatly, the make to order method replaces the traditional mass production and competition between enterprises trend to be furious after China joins WTO. Enterprises must control cost effectively if they want to survive in fierce market competition[1].

The traditional cost accounting method values the direct cost, but the distribution of indirect cost is based on the direct labor hours or machine hours [2] [3]. When product type is few or indirect cost proportion is little, traditional cost accounting method could provide accurate cost information. However, as time goes on, cost structure changes greatly, the proportion of manufacturing cost increases. In this case, product cost could not be calculated correctly with traditional cost accounting method and Activity-based costing may be more suitable for the enterprise[4].

Activity-Based Costing reaches deep into activity level from traditional product level through controlling the key point. With Activity-based costing, all expenses can be distributed more reasonably and work flow can be optimized [5][6].

The status of cost management in a steel pipe enterprise in tianjin

In this enterprise, the process flow diagram of welded pipe production is shown in Fig. 1.

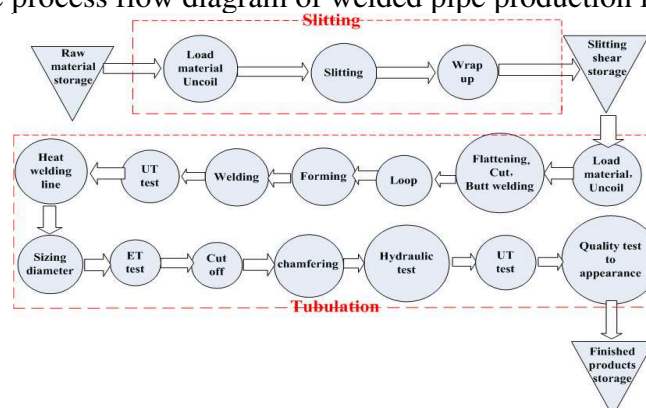


Fig. 1. The process flow diagram of welded pipe production.

In this enterprise, traditional cost accounting method is used to calculate the costs of steel strip and welded pipe – ie the raw material cost and waste recovery amount are taken as direct raw material cost, but the expenses, such as wages and electric charges, are distributed to products based on product weight. Corresponding computational formula of distributive law is as Equation 1.

$$r = \frac{c_k \times P_k}{\sum_{k=1}^n c_k \times P_k} \quad (1)$$

Where

r distributive law

C_k unit standard cost, such as wages, electric charges and spare parts expenses, of model k of welded pipe (k=1.2.3.....n)

P_k output of model k of welded pipe in this month

n the quantity of welded pipe type

Through analyzing the current cost accounting method, we find it has some problems as below.

a) Depreciation expenses of equipment are not considered with the current cost accounting method. In this enterprise, depreciation expenses are not distributed to each month according to depreciable life when dealing with depreciation expenses, which will lead to cost deviation when calculate the costs of semi-finished and finished goods each month.

b) The current cost accounting method takes expenses, such as sales and management expenses, as period expenses, not product cost, it will also lead to cost deviation.

c) The type of product is too many and the output ratio between some types even reach to hundred times. Traditional cost accounting method will also lead to cost deviation in such case.

d) This enterprise only considers slitting and tabulation process when calculate welded pipe costs, but the tabulation process includes many working procedures as Figure 1. All these working procedures are combined into one process with traditional cost accounting method, which may lead to distortion of cost information.

Feasibility and necessity analysis of implementing Activity-Based Costing

A. Necessity analysis

a) *The product cost structure changes. Traditional cost accounting method will lead to inaccuracy of manufacturing expenses and cost information.*

b) Welded pipe production has lots of production processes as Figure 1. These intermediate processes are not considered with traditional cost accounting method .

c) Period charges are not considered when calculating product costs, which must lead to cost messages inaccuracy.

d) To meet the needs of market competition and steel pipe enterprise transformation.

B. Feasibility analysis

a) With the increasingly fierce market competition, enterprise is willing to master cost information for setting product prices and reducing costs.

b) Enterprise staff have good professional knowledge and software operation ability.

c) In this enterprise, some production lines have been automated and it owns ERP, MES, WMS and other information systems. All of these provide foundation for implementing Activity-Based Costing.

The implementation of Activity-Based Costing in the enterprise

A. Activities determination

The main methods of activities determination are Activity mapping, Activity flow analysis and Consulting [5]. Activity flow analysis can be used to determine activities through analyzing the current production situation of the enterprise.

Firstly, all relevant activities of welded pipe production should be analyzed and determined. Then all activities should be listed. The activities is shown as Fig. 1.

All activities in Fig. 1 are analyzed, cost pools are determined and activities are combined. Combined activities are listed in Table I.

TABLE I. COMBINED ACTIVITIES

	Activities name	Activities segmentation
1	Load material	Load material, uncoil, flattening, butt welding
2	Forming	Forming, welding, heat welding line, Sizing diameter and chamfering
3	Cut off	Cut off
4	Test	UT test, ET test, hydraulic test and appearance test
5	Transportation	Transportation activity
6	Manage	Manage activity

B. Cost drivers determination

Each activity should be analyzed and then cost drivers are determined. Determined cost drivers are shown in Table II.

TABLE II. COST POOLS AND COST DRIVERS

	Cost pools	Cost drivers
1	Load material cost pool	Machine hour
2	Molding cost pool	Machine hour
3	Cut off cost pool	The quantity of welded pipe is cut off
4	Test cost pool	Test times
5	Transportation cost pool	Tons transportation
6	Manage cost pool	Production weight

C. Cost accumulation of cost pool

The cost accumulation of cost pool is according to the actual cost of each cost pool. The cost accumulation of cost pool of this enterprise in January, 2011 is shown in Table III.

TABLE III. THE COST ACCUMULATION OF COST POOL IN JANUARY, 2011

	Load material	Forming	Cut off	Test	Transportation	Management	Total
Wages and additional(yuan)	0	0	0	0	0	603657	603657
Depreciation cost(yuan)	12554.75	874958.24	58836.25	575156.66	0	0	1521505.9
Repair charge(yuan)	4500.7	175816.45	11450.2	96600.35	0	0	288367.7
Consumable amortization	23586.45	458368.76	46625.13	74556.28	0	0	603136.62
Transportation cost (yuan)	0	0	0	0	186286	0	186286
Other charges (yuan)	0	0	0	0	0	65245	65245
Power fuel(yuan)	29864.57	380726	32865.68	246003	0	0	689459.25
Total (yuan)	70506.47	1889869.45	149777.26	992316.29	186286	668902	3957657.47

D. Computation of cost driver rate

Corresponding computational formula of cost driver rate is as Equation 2.

$$R_i = F_i / M_i \quad (2)$$

Where

R_i the cost driver rate of cost pool i

F_i the cost of cost pool i

M_i the total amount of drivers of cost pool i

Cost pool cost can be gained from Table III, the total amount of drivers can be gained according to the actual production situation of the enterprise. Cost driver rate of each cost pool is shown in Table IV.

TABLE IV. COST DRIVER RATE

	Load material	Molding	Cut of	Test	Transportation	Management
Cost pool cost(yuan)	70506.47	1889869.45	149777.26	992316.29	186286	668902
Total amount of drivers	2730	2660	1442444	1442444	25053.36	25053.36
Cost driver rate	25.827	710.477	0.104	0.688	7.436	26.699

E. Computation of indirect cost of welded pipe.

Corresponding computational formula of indirect cost is as Equation 3.

$$OH_i = \sum_{j=1}^n R_j \times D_{ij} \quad (i = 1, 2, 3 \dots, m, \quad j = 1, 2, 3 \dots, n) \quad (3)$$

Where

OH_i the indirect cost of product i

R_j the cost driver rate of cost pool j

D_{ij} the amount of cost driver that product i consumes cost pool j

Welded pipe $20.5 \times 2.0 \times 6.0$ (diameter:20.5mm, thickness:2.0mm, length:6.0m) is taken as example, the indirect cost of welded pipe $20.5 \times 2.0 \times 6.0$ is shown in Table V.

TABLE V. INDIRECT COST OF WELDED PIPE $20.5 \times 2.0 \times 6.0$.

	Load material	Molding	Cut of	Test	Transportation	Management	Total
Cost driver rate	25.827	710.477	0.104	0.688	7.436	26.699	
Amount of cost driver	24.5	23	23653	23653	120.36	120.36	
Indirect cost(yuan)	632.75	16340.98	2456.03	16271.87	894.95	3213.5	39810.07

Cost accounting system

Cost accounting system mainly includes raw material receiving/delivery/storage management, the accounting of slitting, the accounting welded pipe production and basic data management

A. Raw material receiving/delivery/storage management

Raw material receiving/delivery/storage management can receive/delivery/balance the raw material of corresponding month and query the receiving/delivery/storage of raw material, it can perform statistical computing to the quantity, price and amount of the beginning, ending period and in-out warehouse of various coil types, it can also realize the functions of query and report printing.

Date	Raw material	Beginning quantity	Beginning price	Beginning amount	In store quantity	In store price
201101	1030*3.75	0	0	0	1152.86	4556.87
201101	1030*4	0	0	0	1482.32	4556.89
201101	1055*3.25	211.14	4560.31	962865.42	1188.52	4712.92
201101	1055*3.5	49.92	4514.8	225379.17	4176.86	4709.68
201101	1055*3.75	0	0	0	1272.2	4709.88
201101	145*2.5	0	0	0	688	4453.74
201101	145*2.75	0	0	0	489.4	4462.74
201101	145*3	0	0	0	2328.38	4470.54
201101	145*3.25	0	0	0	805.32	4463.75
201101	183*2.5	0	0	0	506.82	4446.2
201101	183*2.75	0	0	0	407.82	4453.43
201101	183*3	0	0	0	1020.64	4451.52
201101	183*3.25	0	0	0	628.02	4453.02
201101	232*2.75	0	0	0	250.24	4456.42
201101	232*3	0	0	0	649.74	4558.09
201101	232*3.25	0	0	0	1415.08	4553.17
201101	232*3.5	0	0	0	644.04	4675.56

Fig. 2. The interface of raw material receiving/delivery/balance.

B. The accounting of slitting

The accounting of slitting is used to realize the functions of cost accounting, receive/delivery/balance to steel strip and corresponding query. It can be used to perform statistical computing to the quantity, price and amount of coil, it can also perform statistical computing to output and total cost of steel strip and other expenses, such as transportation cost, electric charge and processing costs, for steel strip production. The interface of steel strip cost is as Fig. 3.

	Date	Steel strip	Output	Raw material cost	Processing charges	Wast amount	Unit cost	Steel strip cost
Raw material cost	201101	126*2.5	969.81	4637269.84	17845.68	112631.85	4683.89	4542483.67
Wast amount	201101	126*3	961.6	4608129.75	17694.6	116376.26	4689.53	4509448.09
Processing charges	201101	126.5*2.75	2567.24	12351415.31	47240.33	356831.28	4690.96	12042824.36
Total costs	201101	351*3.25	1386.86	6650097.5	25519.91	49388.77	4777.86	6626228.64
	201101	351*3.5	4189.29	20147710.66	77088	138056.4	4794.78	20086742.26
	201101	351*3.75	1255.29	6067525.85	23098.85	40926.4	4819.36	6049698.3
	201101	42*2.5	30.61	144685.87	563.26	2059.43	4677.87	143189.7
	201101	42*2.75	43.05	204970.02	792.16	4231.18	4681.32	201531
	201101	515*3.9	967.82	4507009.25	17809.06	73689.99	4599.13	4451128.32
	201101	515*4	1305.61	6173528.64	24024.81	73615.1	4690.48	6123938.35
	201101	515*4.15	179.63	840882.44	3305.4	15389.53	4613.92	826798.31
	201101	515*4.5	60.07	322325.89	1105.37	6515.27	5275.78	316915.99
	201101	516*3.15	105.8	496139.42	1946.85	9960.13	4613.67	488126.14
	201101	516*3.4	481.08	2253580.06	8852.45	38642.31	4622.5	2223790.2
	201101	516*3.65	1263.47	5900000.94	23249.38	94321.69	4613.43	5828928.63
	201101	516*3.75	2101.67	9862384.62	38673.27	97991.21	4664.42	9803066.68
	201101	61.7*2.5	670.69	3348593.33	12341.5	88180.86	4879.67	3272743.97
	201101	680*4	98.57	6001.2	1813.81	5429.39	24.2	2385.62

Fig. 3. The interface of steel strip cost.

C. Basic data management

Basic data management can be used to realize the function of managing the specifications of welded pipe, steel strip and coil.

Conclusions

The right cost accounting method is very important for an enterprise to calculate the accurate cost. In this paper, through analyzing cost management status of a steel pipe enterprise, feasibility analysis and necessity analysis, we find that Activity-Based Costing may better suit the enterprise. Then we apply Activity-Based Costing to the enterprise. At last a cost accounting system based on Activity-Based Costing is developed.

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