COSTING AS A TOOL OF LABOUR CONSUMPTION MANAGEMENT OF METALLURGICAL PRODUCTION

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Abstract

The article is focused on the management of labor consumption in the metallurgical industry using costing of metallurgical products. Costing is generally used as a tool for cost management, especially variable costs; here in costing there are normally reported consumptions of these costs per the production unit in monetary units. With unit costs costing also includes their specific consumptions per unit of production in natural units, especially in the areas of consumption of charge material. The article points to the fact that in the metallurgical production there are also known cases of the specific consumption of time per the unit of production, i.e. the labor consumption of individual products, which are however in the Product costing only indicated to a limited extent. This article proposes the system of using labor consumption of individual products listed in the costing to manage the Labor consumption of the metallurgical production.

Keywords: Costing, labor consumption, management, costs

1. INTRODUCTION

A cost allocation base has been described as incorrigible, since it is impossible to objectively determine which base perfectly describes the link between the cost and the cost objective. Given this subjectivity in the selection of a cost-allocation base, it has always been difficult for managers to determine “When costs should be allocated?” and “On what basis should costs be allocated?” The answers to these questions depend on the principal purpose or purposes of the cost allocation. [1]

Costing is generally used as a tool for economic management in the area of costs within the custom made and also the repetitive manufacturing, where most of the metallurgical production belongs. Costing contains information not only in monetary terms, but also in terms of volume, for example in the form of specific consumptions of the unit material with the repetitive manufacturing, which are part of the statement of BOM (Bill of Materials).

Managers must be prepared to react on current market situation. First, they should explore ways to reduce the resources required to perform various activities. Then to transform those reductions into profits, they must either reduce spending on those resources or increase the output those resources produce. [2]

Our world is continuous changing and that changing conditions often require a change in cost management systems. [3]

Also the labor consumptions of the products may be a part of the costing - these are specific consumptions of net operating (labor or machinery) time per unit of production of each product (calculation units of the objects of calculation) within each technological stage of the production (production facilities). Labor consumptions in the metallurgical industry are most often defined in minutes per ton of production (min/t).

However, in the metallurgical repetitive production the reciprocal value of the machine labor consumption of individual products is used more frequently; namely these are outputs defined within the individual manufacturing facilities. Outputs in the metallurgical production are most often defined in tones produced per operating hour (t/h.).

The method of scheduling proportionally to the time consumption of the metallurgical products production is commonly used when calculating costing for scheduling fixed costs for metallurgical products [4].

However, often for this scheduling so called Labor consumption coefficients are used instead of the time consumption values; these coefficients are calculated from the value of these products outputs. Coefficients of Labor consumption then express the relationship between the value of the maximum output (numerator) and the values of the output of individual products (denominator). Practically this means that for the highest output the value of the Labor consumption coefficient = 1; with the half output this value = 2.

Using the Labor consumption coefficients in the costing of metallurgical products instead of labour consumption values prevents the use of costing as a labor consumption management tool in the metallurgical industry.

2. METHODS DATA

Using the labor consumption in the costing of metallurgical products has two principal benefits:

- Values of labor consumption of products can be used as reference values (cost drivers) for the allocation of fixed overheads of individual metallurgical activities to products. (The article [5] has been dedicated to this issue.)
- The Labor consumption of products can be used to calculate the so-called Recounted planned values of the Net operating time of individual production facilities. The basis of this calculation is the conversion of the planned values of the Labor consumption using the actual amount and the structure of production. In a similar way, costing is used to calculate the Recounted plan of variable costs, which is very important for evaluating the actual variable costs.

2.1 Including the labor consumption in the calculation formula

The most suitable calculation formulas for the use for labor consumption include the Dynamic calculation formula and the Calculation formula according to activities (ABC).

The Labor consumption may be within the costing item created for this purpose incorporated anywhere in the costing formula. For the reasons of practicality we can recommend its adding only to the end of the costing formula.

In order to use the product costing for the management of the Labor consumption of the metallurgical production it is necessary that the costing item of the Labor consumption includes types of values listed in the **Table 1**.

Table 1 Example of types of values in the product costing required for working with labour consumption

KM	ms_i	*SM*
Costing amounts (e.g. tons)	Specific time consumption of the *i*-th product (e.g. minute/ton)	Consumed amount of time (hours)
Source: Planned or actual production volume of the given product	Source: Planned specific time consumption per unit of production	Calculation: $KM \times ms_i / 60$

2.2 Possibilities of using costing for managing labor consumption of the metallurgical production

These possibilities are as follows:

a) Calculation of the total planned need of the net operation time prior to the start of the production
   - Based on planned specific consumption of net operating time (Labor consumption) and the planned s production volumes in the detail for individual products.

b) Recounting the total planned need for the net operating time after the production completion
- Based on planned specific consumption of net operating time (Labor consumption) and actual production volumes in the detail for individual products.

c) Calculation of the impact of the volume and composition of the production and the impact of Labor consumption on the actual value of the net operating time compared to its original planned value
- On a basis of the comparison of the planned, recounted and actual value of the Net operating time.

3. EXPERIMENTAL PART AND RESULTS

The use of the Labor consumption in the Product Costing is subject to mastering calculations of the Planned value of the net operating time (CPC_{Pl}) and the so-called Recounted values of the net operating time (CPC_{Pr}). For the calculation of these times in costing for individual products values that are listed in the **Table 1** can be used.

The total values of CPC_{Pl} and CPC_{Pr} for each production facility are consequently calculated as the sum of the values calculated in the "*SM*" column (see **Table 1**) for individual products.

To provide the basis for the management of Labor consumption for individual metallurgical production facilities using costing it is necessary to provide the following calculations in the costing:

a) The calculation of the total planned need of the net operating needs time prior to the production start:

$$CPC_{Pl} = PlQ_1 ms_1 + PlQ_2 ms_2 + PlQ_3 ms_3 + \cdots + PlQ_n ms_n = \sum_{i=0}^{n} PlQ_i ms_i \quad (1)$$

CPC_{Pl} - Plan of the needs of the total net operating time of the given production equipment
PlQ_i - The planned production volume of the *i*-th product
ms_i - Planned specific consumption of time (labor consumption) of the *i*-th product
n - Number of product costing (costing units of the object of calculation)

b) Recounting of the total planned need for the net operating time after production completion:

$$CPC_{Pr} = SkQ_1 ms_1 + SkQ_2 ms_2 + SkQ_3 ms_3 + \cdots + SkQ_n ms_n = \sum_{i=0}^{n} SkQ_i ms_i \quad (2)$$

CPC_{Pr}- Recounted plan of the total net operating time of the given production facility for the actual volume and structure of production
SkQ_i - Actual production volume of the *i*-th product
ms_i - Planned specific time consumption (labor consumption) of the *i*-th product
n - Number of costings of products (costing units of the objects of calculation)

c) Impact of the actual production volume and o structure to the planned need for the net operating time:

$$\Delta CPC_{Pl-Pr} = CPC_{Pl} - CPC_{Pr} \quad (3)$$

d) The difference between the planned and actual values of the labor consumption to the actual amount of the net operating time:

$$\Delta CPC_{Pr-Sk} = CPC_{Pr} - CPC_{Sk} \quad (4)$$

CPC_{Sk} - The actual total amount of the net operating time of the given production facilities

Calculations of a) and b) can be arranged directly in within the calculation system. Calculated values $PlQ_i ms_i$ and $SkQ_i ms_i$ should be included in the values under the "Labor consumption" item (see the column *SM* in

Table 1). Values CPC_{Pl} and CPC_{Pr} can be in the costing system derived from the sums of $PlQ_i ms_i$ and $SkQ_i ms_i$ values for all calculation units of objects of calculation (products) of a given production equipment. CPC_{Sk} value can then be obtained from the operational records of the respective production equipment.

4. RECOMMENDATION

The management of Labor consumption is closely related to the production capacities. If the production facility in the monitored period produces more kinds of products with different level of Labor consumption, the total consumption of net operating time is affected both by the production volume and the production structure. Therefore, for the evaluation of the use of this time within individual production facilities it is not enough to use just the comparison of the planned consumption of the net operating time (CPC_{Pl}) with its real consumption (CPC_{Sk}). To distinguish the effects of the production volume, the production structure and the performance of the planned Labor consumptions within the net operating time, it is necessary to perform the calculation of the so called Recounted plan of the net operating time to the current volume and structure of the production (CPC_{Pr}).

The planned values of the Labor consumption listed in the costing can be used both to calculate the total planned need of the net operating time (CPC_{Pl}) required for the planned volume and structure of production, and to calculate the total recounted planned need of the net operating time (CPC_{Pr}) required for the actual volume and composition of the production within the individual manufacturing facilities.

The difference between CPC_{Pl} a CPC_{Pr} is caused by the impact of the production volume and product mix. The difference between CPC_{Pr} and CPC_{Sk} is created by differences between planned and actual labor consumptions of individual products. This last distinction is very important to check the feasibility of the planned values of Labor consumption, which is very often used in the calculation of the planned costing of the full costs. This costing often forms the basis for the valuation of inventory of own production and price negotiations. So any unrealistic data in the field of used values of Labor consumption directly influence both the costing calculation itself and its subsequent use for economic and pricing decisions.

5. CONCLUSION

The information contained in the planned (preliminary) calculations should be both values of the specific consumption of materials and energy, as well as the specific consumption of the net operating time (Labor consumption), which express the time consumption of the production of individual products. Based on the planned values the Labor consumption it is possible to calculate in costing the need of the net operating time both for the planned and the actual production volume and product mix of the given production equipment. In this way you can get the Planned value of the net operating time (CPC_{Pl}) and the Recounted value of the net operating time (CPC_{Pr}). The actual value of the net operating time (CPC_{Sk}) of the given production facility can usually be obtained from the operational records. These values are very important to distinguish the influence of the production volume, the influence of the product mix and the impact of labor consumptions within the evaluation of the consumption of the net operating time. [6]

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REFERENCES

[1] HORNGREN C. T. Management Accounting. Pearson Canada, 2001.

[2] COOPER R., KAPLAN R. S. Profit Priorities from Activity-Based Costing. Harvard business review, Vol. 69, No. 3, 1991, pp. 130-135.

[3] HANSEN D. R. Cost Management: Accounting & Control. South-Western Publishing Co., 2003.

[4] JANOVSKA K., VILAMOVA S., VOZNAKOVA I., SAMOLEJOVA A., SVECOVA E., BESTA P. Cost Management in Metallurgical Production. METALURGIJA, Vol. 51, No. 4, 2012, pp. 574-576.

[5] KUTAC J., SAMOLEJOVA A., STOCH D., ANDRUSKA L. The Issue of Overhead Costs Allocation According to Labour Inputs in Target Costing of Metallurgical Production. In METAL 2014: 23rd International Conference on Metallurgy and Materials. Ostrava: Tanger, 2011, pp. 1767-1771.

[6] VOZNAKOVA I., JANOVSKA K., VILAMOVA S. Cost Controlling in Terms of Metallurgical Production. In METAL 2011: 20th Anniversary International Conference on Metallurgy and Materials. Ostrava: Tanger, 2011, pp. 1271-1278.