

## **COSTING AS A TOOL OF LABOUR CONSUMPTION MANAGEMENT OF METALLURGICAL PRODUCTION**

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### **Abstract**

The article is focused on the management of Labour 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 labour consumption of individual products, which are however in the Product costing only indicated to a limited extent. This article proposes the system of using labour consumption of individual products listed in the costing to manage the Labour consumption of the metallurgical production.

**Keywords:** Costing, Labour consumption, Management, Costs.

### **1. INTRODUCTION**

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).

Also the **labour consumptions** of the products may be a part of the costing – these are specific consumptions of net operating (labour 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). Labour 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 labour 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 tonnes 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.[1]

However, often for this scheduling so called Labour consumption coefficients are used instead of the time consumption values; these coefficients are calculated from the value of these products outputs. Coefficients of Labour 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 Labour consumption coefficient = 1; with the half output this value = 2.

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

## **2. METHODS DATA**

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

- Values of labour 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 „The Issue of Overhead Costs Allocation According to Labour Inputs in Target Costing of Metallurgical Production“ published in Metal 2014 has been dedicated to this issue.)
- The Labour 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 Labour 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 labour consumption in the calculation formula**

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

The Labour 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 Labour consumption of the metallurgical production it is necessary that the costing item of the Labour 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 <sub>i</sub>	SM
Costing amounts (e.g. tons)	Specific time consumption of the i-th product (e.g. minute/tonne)	Consumed amount of time (hours)
<i>Source:</i> Planned or actual production volume of the given product	<i>Source:</i> Planned specific time consumption per unit of production	<i>Calculation:</i> $KM \times ms_i / 60$

### **2.2 Possibilities of using costing for managing labour consumption of the metallurgical production**

- 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 (Labour consumption) and the planned s production volumes in the detail for individual products.
- Recounting the total planned need for the net operating time after the production completion**
  - based on planned specific consumption of net operating time (Labour 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 Labour 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 Labour 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 (tab. No. 1.) for individual products.

**To provide the basis for the management of Labour 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**

$$CPC_{Pl} = PlQ_1ms_1 + PlQ_2ms_2 + PlQ_3ms_3 + \dots + PlQ_nms_n = \sum_{i=0}^n PlQ_i ms_i$$

$CPC_{Pl}$  = 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 (labour 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**

$$CPC_{Pr} = SkQ_1ms_1 + SkQ_2ms_2 + SkQ_3ms_3 + \dots + SkQ_nms_n = \sum_{i=0}^n SkQ_i ms_i$$

$CPC_{Pr}$  = 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 (labour 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 =**

$$= \Delta CPC_{Pl-Pr} = CPC_{Pl} - CPC_{Pr}$$

- d) **The difference between the planned and actual values of the labour consumption to the actual amount of the net operating time =**

$$= \Delta CPC_{Pr-Sk} = CPC_{Pr} - CPC_{Sk}$$

$CPC_{Sk}$  = 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 "Labour consumption" item (see the column SM tab. No.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 Labour 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 Labour 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 ( $CPC_{PI}$ ) with its real consumption ( $CPC_{SK}$ ). To distinguish the effects of the production volume, the production structure and the performance of the planned Labour 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 Labour consumption listed in the costing can be used both to **calculate the total planned need of the net operating time ( $CPC_{PI}$ ) 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  $CPC_{PI}$  and  $CPC_{Pr}$  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 labour consumptions of individual products. This last distinction is very important to check the feasibility of the planned values of Labour 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 Labour consumption directly influence both the costing calculation itself and its subsequent use for economic and pricing decisions.

#### 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 (Labour consumption), which express the time consumption of the production of individual products. Based on the planned values the Labour 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 ( $CPC_{PI}$ ) 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 labour consumptions within the evaluation of the consumption of the net operating time. [2]

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