# THE IMPACT OF PRODUCTION CAPACITY UTILIZATION ON METALLURGICAL COMPANIES FINANCING

The most important and the most problematic in-house sources of financing of metallurgical companies are profit and depreciations. In the event that the aggregate value of the economic result and depreciations goes over to negative values, then this kind of in-house financing ceases to increase Cash Flow of the company but, on the contrary, it will cause its reduction. It means that this type of financing is to some extent uncertain, particularly in times of crisis, when there are noticeable fluctuations in sales volumes, leading to a significant influence of the volume of production on the amount of profit. The article discusses the impact of production capacity utilization on metallurgical companies financing.

*Key words:* metallurgical production, production capacity, financial resources, Cash Flow

## INTRODUCTION

Obtaining financial resources and their use to secure the necessary goods and to cover the expenditures of company activities is referred to as financing. Companies have several options available to ensure their financing. An enterprise may be financed either from foreign sources, which include mainly loans from banks and short-term liabilities, or from its own resources, especially from the basic capital, depreciations and profit. It depends on each company and its financial management which of the possible sources it will decide for and which is the most suitable one for its unique character and internal organization. The most effective solution is, in most cases, a combination of more of them.

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The factors that have recently had the highest share on the economic result of metallurgical enterprises include the impact of exchange rates, the impact of input prices, the impact of sales prices and the impact of production volume (influence of unused production capacities). The rate of the Czech currency, especially against Euro or Dollar, is a factor that cannot be influenced by the company. Its impact on the economic result can be managed by the company to some extent, but not significantly and permanently. Regarding the influence of prices, each firm tries to reduce the purchase prices and

increase the selling prices. This attempt is understandable, but we can in no way assume that any eventual successes in this area could offset the losses resulting from the simultaneous impact of unused production capacities. This effect has the most significant impact on the economic result at the moment.

The impact of unused production capacities on Cash Flow (CF) and on company financing is based just on this effect on the economic result (ER).

## EXPERIMENTAL PART AND RESULTS

It is desirable to define the required formulas in order to calculate the effect of unused production capacities (rolled material) in metallurgical enterprises in the Czech Republic on the ER and CF, based on the available information.

The effect of unused production capacities on the ER is calculated as an influence of the production volume on the ER, which is based on the product of the volume of unused production capacities in volume units (tonnes) and the gross spread per unit of production (€/t). The gross spread [1] is the difference between the price and variable costs per unit of production volume. It is a contribution to cover the fixed costs and profit [2].

Gross spread calculation [1]:

$$KPj = Cj - Vj \qquad (1)$$

$KPj$ - gross spread per unit of production (€/t)
$C_j$ - sales price (€/t)
$V_j$ - variable cost per unit of production (€/t)

Effect of utilization of production capacity on ER [3]:

$$k_c = \frac{Q_s}{Q_p} \qquad (2)$$

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J. Kutáč, K. Janovská, Š. Vilamová, P. Besta, A. Samolejová, I. Vozňáková, Faculty of Metallurgy and Materials Engineering, VŠB – Technical University of Ostrava, Ostrava, Czech Republic

$k_c$  - production capacity utilization coefficient
$Q_s$  - real production volume (tonnes)
$Q_p$  - production capacity (tonnes)

Unused production capacity-capacity reserve in units of production [2]:

$$Q_r = Q_p - Q_s \qquad (3)$$

$Q_r$  - capacity reserve (tonnes)
$Q_p$  - production capacity (tonnes)
$Q_s$  - real production volume (tonnes)

From the above presented formulas, we can derive a formula for the unused production capacity coefficient:

$$k_n = \frac{Q_r}{Q_p} \qquad (4)$$

it means that:

$$k_c + k_n = 1 \qquad (5)$$

$k_n$  - unused production capacity coefficient
$k_c$  - used production capacity coefficient

A coefficient of the relation between unused and used (real) production capacity can be derived in a similar way:

$$k_v = \frac{Q_r}{Q_s} \qquad (6)$$

it means that:

$$k_v = \frac{(1 - k_c)}{k_c} \qquad (7)$$

$k_v$ - coefficient of relation between unused and used production capacity
$k_c$ - used production capacity coefficient

The calculation of the influence of unused production capacity on the VH (total amount of the gross spread) is based on the formula:

$$VHr = Qr \cdot KPj \qquad (8)$$

$VHr$ - influence of capacity reserves on the economic result (€)
$Qr$  - capacity reserve (tonnes)
$KP_j$ - gross spread per unit of production (€/t)

The calculation of the influence of the unused production capacity on the ER in relation to the unit of real production volume is based on the formula:

$$VHj = \frac{VHr}{Qs} \qquad (9)$$

$VHj$  - influence of unused production capacity per unit of real production volume (€/t)

In cases where there is no indication of real volume of production, but only a coefficient (percentage) of production capacity utilization ($k_c$) and the information on the amount of the gross spread per unit of production ($KP_j$), it is suitable to calculate the effect of unused production capacities on the economic result in relation to a unit of real production volume using the following formulas derived from the previous ones:

$$VHj = KPj \cdot kv \qquad (10)$$

$VHj$ - impact of production volume in relation to unit of real production volume (€/t)
$KP_j$  - gross spread per unit of production (€/t)
$kv$  - relation between unused and used production capacity

The last formula can be practically used to calculate the general impact of unused production capacities per unit of real production volume.

In case of metallurgical production of the Czech Republic, we can consider a gross spread ranging from 80 to 180 €/t, which are values typical for majority of metallurgical productions. This range of gross spread values relate to VHj values presented in Table 1.

Multiplying the real production volume of a concrete metallurgical enterprise by a value presented in the table above, within the scope of the corresponding amount of gross spread and utilization of production capacity, helps us to calculate the total value of the impact on economic results of the given company in € and, at the same time, the impact on the financing of the company itself using their own resources.

Table 1 **Impact of production capacity utilization on economic result in €/t of real production volume**

| Gross spread | Production capacity utilization % | | | | | |
|---|---|---|---|---|---|---|
| | 100 | 90 | 80 | 70 | 60 | 50 |
| 180 €/t | 0 | 20 | 45 | 77 | 120 | 180 |
| 170 €/t | 0 | 19 | 43 | 73 | 113 | 170 |
| 160 €/t | 0 | 18 | 40 | 69 | 107 | 160 |
| 150 €/t | 0 | 17 | 38 | 64 | 100 | 150 |
| 140 €/t | 0 | 16 | 35 | 60 | 93 | 140 |
| 130 €/t | 0 | 14 | 33 | 56 | 87 | 130 |
| 120 €/t | 0 | 13 | 30 | 51 | 80 | 120 |
| 110 €/t | 0 | 12 | 28 | 47 | 73 | 110 |
| 100 €/t | 0 | 11 | 25 | 43 | 67 | 100 |
| 90 €/t | 0 | 10 | 23 | 39 | 60 | 90 |
| 80 €/t | 0 | 9 | 20 | 34 | 53 | 80 |

If an average sales price of rolled material is, for example, about 550 €/t and the gross spread is approximately 25.5% of the sales price, which are average values for rolled material common in the Czech Republic, the gross spread is about 140 €/t.

A decrease in sales of rolled material in metallurgical companies in the Czech Republic in 2011 (4,974 million tonnes) by 1.3 million tonnes [3], compared to 2006 (6,274 mil. tonnes), indicates deterioration of economic results of these enterprises by about 182 million € when the average level of gross spread is 140 €/t. This impact is logically reflected in the reduction of their own resources usable for financing, thus significantly reducing investments into modernization of metallurgical production.

## DISCUSSION

The tasks associated with determining the size of production capacity and its utilization belong to the most important factors of company economics. The ca-

pacity is a factor that affects both the total cost and the separate utilizations of the fixed costs. If we examine this factor in relation to the fixed costs, we must also take into account the type of production capacity, i.e. whether it is the use of machinery (technological) equipment or the labour force [4]. The capacity of machinery equipment in metallurgical production is based on the annual calendar time, and on the annual amount of fixed costs associated to this capacity. The labour force capacity has a discontinuous character and it is based on the possibility of its utilization within a scope of a single-team up to quadruple-team operation. The fixed costs associated with this capacity have discontinuous course as well, characterized by their so-called step change when changing the working mode. Significant changes in the working mode (adding or cancelling shift) often cause expense lag (e.g. costs of compensations, retraining of employees) in the area of fixed costs.

At present, the non-utilization of production capacities has influence on the decrease of the efficiency of the expended fixed costs, as a result of their digression.

The categories of used and free fixed costs represent a possible expression of this fact, although they are not very often used in metallurgical companies. This is a fictional division of the total fixed costs to a value corresponding to the level of capacity utilization (used fixed costs) and the value that is proportional to the degree of unused production capacity (free fixed costs). Although the total fixed costs of these two parts cannot be divided in the budgets and calculations, the explanatory power of these categories is important for information, especially in terms of the value expression of the unused part of production capacity [5].

The decline in production efficiency due to unused production capacity can be offset directly through savings of fixed costs. It is necessary to take into account the different suggestibility of the amount of fixed costs when decreasing production, which is based on the nature of their origin.

The costs are divided into the so-called sunk costs, which were mostly incurred in the past, before the actual production launch and which de facto determined the purpose of the business process. The reduction of capacity utilization has no effect on their amount. This category also includes depreciations of fixed assets related to the subject of the main business activity. The possibility of elimination of these costs is given by their potential alternative utilization for a different kind of business activity [5].

The costs are also divided into the so-called avoidable costs. They arise as a result of securing the conditions of the entrepreneurial process as a whole, including the security of the created production capacity. When reducing the utilization of production capacity, it is possible to reduce the avoidable costs. However, the amount of savings related to these costs must not jeopardize the product quality, safety, work organization, etc., and cause other, especially fixed costs. Time wages

of foremen, unskilled workers, and administrative workers, costs of heating, lighting and protective equipment can serve as examples of this type of costs. These costs are more closely associated with the expenditure on their settlement, because they appear continuously, especially during the production process. These costs savings will be reflected in a jump of fixed costs, which, however, doesn't mean their absolute reduction, while maintaining the same production capacity [5].

## CONCLUSION

The tasks associated with determining the size of production capacity and its utilization are one of the most important areas of company economics. The deterioration of economic results of metallurgical enterprises due to unused production capacities raises both the pressure to reduce all costs, which is fine if there is no deterioration of product quality, but it often goes hand in hand with an effort to reflect this influence in the sales price. However, this is the beginning of a vicious circle which can be characterized by stating: "We have no orders, because we have a high sales price, we have a high sales price, because we have unused production capacities."

One way how to address this vicious circle is not to determine the final sales price from the cost per unit of production taking into account unused capacities, but to use the costs that correspond to the target (optimal) capacity utilization. If the sales price defined using this method does not provide a corresponding increase in sales volume and production, then it is necessary to get rid of the excess capacities. All other solutions are often associated with drawing their own created sources of financing or with looking for new, foreign sources.

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**Note:** The responsible translator for English language is Petr Jaroš (English Language Tutor at the College of Tourism and Foreign Trade, Goodwill - VOŠ, Frýdek-Místek, CR.