RESEARCHES REGARDING THE ASSURANCE OF THE SUPPLY WITH SPARE PARTS FOR THE MINING EQUIPMENT FROM THE LIGNITE QUARRIES

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Abstract: The present paper deals with how to determine and ensure the necessary materials and spare parts for mining equipment in quarries of lignite.

Keywords: suppliers, spare parts, supply

1. GENERAL

Unlike other economic activities, in the lignite extraction activity, the materials and the spare parts that are supplied are used not only for creating new products but also for extracting coal. Thus, the supply with the spare parts and materials is similar, but at the same time different from the supply activity in other fields.

The supply management is a component of the commercial function of an enterprise and it ensures the balance between the needs and the resources of a trading company.

Supplying and manufacturing the spare parts of an adequate quality and in the prescribed quantity ensures the good development of the activity of equipment maintenance and repair.

The problems that arise when organizing the supply activity with spare parts and materials refer to;

- establishing the necessities for spare parts;
- organizing the contracting and the supply with spare parts;
- organizing the storing and the circulation of the spare parts.

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2. THE SUBSTANTIATION OF DEMAND SPARE PARTS

The supply management, through its *forecast function*, must manifest not only at the level of substantiating the supply programs but also when establishing the supply strategy on the whole, at the level of functional components and at the level of storing processes.

Forecast elements appear at the following fields and sub-fields of action:

1. Creating the supply strategies, which are carried out through:

- the analysis of the necessities of material resources for the materials and spare parts consumption (what general resources the mining company has, what resources are available, what resources are allotted for the consumption);
- deciding on the materials and spare parts that must be supplied (establishing the yearly quantitative level to be supplied, establishing the monthly, quarterly and half yearly shares);
- establishing the products purchase methods in accordance with the legal regulations (auctions, invitation to tender, competitive dialogue, negotiation etc.);
- choosing the winning offers according to the procedures specific to each legal procedure of acquisition (analyzing the offers, possible clarifications from the suppliers, announcing the winners etc.);
- negotiating the sale and purchase conditions with the winning suppliers (delivery conditions, payment conditions, penalties, commercial guarantees, good execution guarantees etc.)

2. Substantiating the supply and supply planning programs, which is carried out through:

- creating an appropriate schedule of materials and spare parts;
- dimensioning the planned specific consumptions of materials and spare parts;
- substantiating on economic basis the necessary materials and spare parts for consumption, taking into account the use of materials and spare parts for the production process, as well as for repairs and implicitly the necessities to be supplied;
- planning the demand for materials and spare parts for the consumption and establishing the delivery deadline of materials and spare parts;
- analyzing the consumption progress and establishing the forecast for the following periods.

3. Managing the storing processes comprises:

- the appropriate selection of the necessary stocks to be made;
- determining the factors that influence the stocks and the parameters of the storing process;
- estimation of the storing costs;
- optimization of the stocks' inventory ;

- forestalling the springing of negative phenomena related to stocks' inventory.

3. ESTABLISHING THE NECESSITY FOR SPARE PARTS

The necessity for spare parts must be established as close as possible to the real needs, as their insufficiency makes the maintenance and repair activity more difficult, while their surplus means useless expenses.

The content of the supply plan and programs is defined by several specific indicators grouped into two categories:

- indicators that reflect the consumption necessities for materials and spare parts, destined to the general activity of the mining company;
- indicators that underline the sources and the potential for quantitative and structural covering of the consumption necessities with material resources.

The content and the structure of the supply plan can be rendered in table1.

Table 1. **The content and the structure of the supply plan**

Consumption necessities, N_C	**Sources to cover the consumption necessities**
1. Necessities for carrying out the production program, N_p; 2. Stock of products at the end of the inventory period, N_p; 3. Total necessities for carrying out the general activity of the mining company, N_{tp}	1. Internal sources (in-house): - pre-established stock of material resources for the beginning of the inventory period, S_{pi}; - other in-house resources, R_{ip}; 2. Sources from outside the mining company: - necessities to be supplied, N_a
Total necessities	**Total resources**

In order for the general activity of the economic units to develop in good conditions it is required a perfect and stable equilibrium between the necessities and resources during the entire inventory period, equilibrium expressed through the following relation:

$$N_p + N_{ps} = S_{pi} + R_{ip} + N_a \tag{1}$$

or

$$N_{tp} = S_{pi} + R_{ip} + N_a \tag{2}$$

resulting

$$N_a = N_{tp} - S_{pi} - R_{ip} \tag{3}$$

The indicator other in-house resources, R_{ip}, comprises the resources that are actually used by the mining company, under the form of spare parts repaired and reused in current activity. Any deviation from this equality causes either over storing or

shortage of materials and spare parts.

A more simple formula that I suggest for the calculation of the necessities to be supplied is the following:

$$N_a = N_c - S_{sep} \tag{4}$$

where S_{sep} represents the actual stock at the end of the accounting period, usually the end of the year.

The actual stock at the end of the accounting period must contain the total of the materials and spare parts, new, repaired or faulty but that can be repaired, as even the repaired ones or the ones that will be repaired will be used in the production activity. The spare parts that have been recovered and proposed for annulment will not be taken into account.

The following formula can be deduced:

$$S_{sp} = S_{pn} + R_{ip} \tag{5}$$

where S_{pn} represents the stock of new spare parts

The formula presented above is more precise, as it takes into consideration the actual stocks existing at the end of the year or the accounting period, but we can determine the necessities for materials to be supplied only after this period has ended.

From experience, we can say that the closure of an accounting period without the help of an on line informatics system takes two weeks.

Also, in order to precisely determine the stocks and the necessities for consumption and supply, every item must have a unique and unitary denomination at the level of the mining company, so the existence of a schedule of items is necessary.

Therefore, in order to substantiate the necessities to be supplied, we must establish the elements that determine their size beforehand, taking into account the real data possessed at that time.

For this preliminary determination of the stocks of materials and spare parts existent at the beginning and the end of the inventory period we can use the following calculations:

$$S_{pi} = S_e + I - C \tag{6}$$

where: S_e represents the actual stock of material resources existent in the warehouses at the time of the estimation; I - the inputs pre-established for the remaining period of time of the current year. It is determined as being the difference between the contracted quantity, I_{ct}, and the supplied quantity, I_{ap}, at which you can add inputs that have not been foreseen initially (supplementary), I_s;

$$I = I_{ct} - I_{ap} + I_s \tag{7}$$

C - consumptions foreseen for the same period which are determined by the relation:

$$C = N_{Cc} - N_{Cr} + N_{Cs}\,, \tag{8}$$

where: N_{Cc} represents the consumption necessities for the current inventory period; N_{Cr} - consumption necessities achieved during the current inventory period; N_{Cs} - supplementary consumption necessities, unforeseen.

The supplied quantity, I_{ap}, in relation to the time limit mentioned in the supply contracts, can be:

- quantity delivered obeying the normal time limits in the contract, I_{tn};
- quantity delivered later than the time limits in the contract (delayed) and accepted due to the production necessities, I_{td}.

It is obvious the relation:

$$I_{ap} = I_{tn} + I_{td} \tag{9}$$

All of the above formulas are correct, but without an integrated informatics system they are difficult to be used if the data are not known. Normally, with the help of an informatics system the necessary data are extracted and you can pre-establish the necessities in due time, in October.

The stock pre-established at the beginning of the year is corrected according to the changes that intervene in the initial elements taken into account.

If the stock pre-established to exist at the beginning of the inventory period is equal to the real stock existent at the end of the previous inventory period S_{ep} then you can say that the elements and the conditions taken into account were correct.

In case S_{pi} is different from S_{ei}, then it is required the correction of the necessities to be supplied by the difference:

$$\Delta S_i = S_{ei} - S_{pi} \tag{10}$$

When there are differences ΔS_i, you can refer to the corrected necessities to be supplied as N_{ac}:

$$N_{ac} = N_a \pm \Delta S_i \tag{11}$$

4. CONCLUSIONS

The necessities for spare parts and materials to be supplied from the internal market or from the import represent the main source in meeting the consumption necessities of a mining unit.

In case an informatics system exists, first it is mandatory to pre-establish certain necessities and then, at the beginning of the following period, these should be corrected according to the actual existing stocks.

The action of modifying the necessities to be supplied is a continuous action, according to the evolution of the coal consumption on the internal market, the

consumption necessities during the inventory period can be reduced or supplemented.

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