METHODOLOGICAL BASES FOR IMPROVING THE STRUCTURE OF PRODUCTION SUBDIVISIONS OF MOTOR TRANSPORT ENTERPRISES

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Due to the different structure of the technical service of motor transport enterprises (MTE) small, medium, large capacity and volume of maintenance work and repair of vehicles, can provide the same competition conditions in the transport market. As follows, the main task when solving the question satisfaction of demand for maintenance services and repair of vehicles is the use of existing production facilities MTE ATP of different departments, that is, transformation of departmental production infrastructures into a regional structure is needed.

Using the proposed method for specific conditions of motor transport enterprise (MTE) will allow based on the numerical value of performance evaluation criteria for maintenance and car repair determine the rational structure of it production and technical base (PTB). This is accordingly, will increase the enterprise efficiency, optimizes PTB and help to identify perspective directions the interaction of transport enterprises and centralized specialized productions for the maintenance and car repair.

The article provides the determining method the expediency of creating or maintaining production units for maintenance and cars repair in motor transport enterprises. Object of study is the formation of the production units’ structure in the motor transport enterprises, depending on the volume of maintenance and repair works. The aim of the work is to increase the efficiency of motor transport enterprises by improving the production departments structure for maintenance and car repair. To achieve the goal in the framework of the work performed, the following research methods were used: analysis of processes and phenomena, hypothetical method, mathematical modeling of processes, mass observation, data statistical processing of the experimental research results.

Terms creation of one or another unit for maintenance and cars repair in the enterprise is a minimum of reduced costs, in which the implementation of a specific type of work is economically appropriate at the specified enterprise. If it is inappropriateness of creation any of the subdivisions, the corresponding works are transmitted for implementation at the nearest ATP, stations of cars maintenance (SCM) or other enterprise where these services are performed.

The method of efficiency estimation of production units for maintenance and cars repair in motor transport enterprises is developed, which allows to make calculations for ATP of different capacities.

Key words: cars, centralized specialized production (CSP), daily service (DS), maintenance, motor transport enterprises (MTE), stations of cars maintenance (SCM), ongoing repair (OR), production and technical base (PTB), production units, repair.

F. 5. Pic. 3. Ref. 12.

1. Formulation of the problem

Automobile transport is the most mobile, effective and universal method of communication and takes a valid place in the transport complex of Ukraine.

The analysis shows, that the existing production structure for maintenance and repair of rolling stock at the present stage does not meet the requirements of effective and safe operation of vehicles and requires considerable capital and operating costs.

Existing production and technical base MTE, which was formed under conditions of planned economy, focused on servicing and repairing only cars, belonging to the enterprises, which is not always appropriate in today's context and reduces the competitiveness of the enterprise in the market of transport services. Maintenance and repair of rolling stock in MTE is carried out, usually, in a technologically closed cycle, that is, the complete list of maintenance and repair work is envisaged. Regardless of the number of cars in the MTE,
that is, the volume of maintenance and repair work, enterprises formed the entire set of production units, fit out them with the necessary technological equipment and complete with production staff. However, for most MTE the completion of the entire list of work the maintenance and repair of rolling stock in a technologically closed cycle is not always appropriate.

Traditional methods of development and updating of production and technical base, firstly, do not allow solving the issue of improving the efficiency work of enterprises, secondly, require significant investment. Therefore, the development of fundamentally new approaches to the formation and development of road transport infrastructure is needed.

2. Analysis of recent research and publications

Issues of improvement of organizational forms of production on maintenance and cars repair, development of production and technical base were considered in the works of such scientists, as PhD, professor Avdonkin F.M., PhD, professor Bidnyak M.N., PhD, professor Bilichenko V.V., PhD, professor Kleiner B.S., PhD, professor Kuznetsov E.S., PhD, professor Kournikov I.P., PhD, professor Napolsky G.M., PhD, associate professor Kartashov V.P., PhD, associate professor Omelyanovich O. R. and other scientists. However, in most works, the issues of improving the technical service structure were considered only within the framework of individual motor transport enterprises or departmental road transport associations.

The analysis of the performed research works on the development of the production and technical base and the improvement of its structure shows, that the issues of improving the production structure of maintenance and cars repair are relevant and require solutions.

3. The aim of the research

The purpose of this article is to develop methodological bases for improving the structure of production subdivisions of motor transport enterprises, which will reduce the cost of cars maintaining in working order.

4. Key research results

The transition to a regional cars manufacturing and repair infrastructure allows in many cases to refuse complex MTE, make greater use of concentration principles, specialization and cooperation, reduce capital expenditures, use existing production potential more efficiently, to create the necessary conditions to complete the needs of vehicle owners in production services.

To provide equal conditions of competition in the market of transport services the structure of production units for the car maintenance and repair in a motor transport enterprise should be different for small, medium and high MTE power and to determine the amount of car maintenance and repair.

To determine the feasibility of creating any of the production units for maintenance and cars repair in the enterprise the criterion adopted is a minimum amount of work on the maintenance and car repair, in which the execution of a specific type of work is economically feasible in the motor transport enterprises. So, production unit to perform the $k$-th type of maintenance and cars repair in the $i$-th MTE it is advisable to create, if the cost of 1 man-hour of work in a motor transport enterprise is less than the cost of 1 man-hour of work of the $k$-th type of work in the $j$-th CSP (pic. 1).

Pic. 1. Determining of the expediency of creating a specific production unit for car maintenance and repair
The purpose function of determining the feasibility of creating or operating a production unit for the maintenance and car repair in motor transport enterprises to perform the k-th type of work is:

\[ C_{k, MTE, i} \leq C_{k, CSP, j}, \]  

(1)

where \( C_{k, MTE, i} \) – the cost of 1 man-hour of the implementation of the k-th type of work in the i-th MTE, uah/man-hour; \( C_{k, CSP, j} \) – the cost of 1 man-hour of the implementation of the k-th type of work in the j-th CSP (cost of the norm-hour), uah/man-hour.

The use of such a criterion is explained by the fact that now the cost of work on the SCM and other specialized maintenance and car repair companies is determined by the cost of one norm-hour for the specified type of work, that is, due to the specific costs of 1 man-hour of labor and the volume of work performed.

The cost of 1 man-hour of the implementation of the k-th type of work in the i-th MTE is determined:

\[ C_{k, MTE, i} = C_{sal, k, i} + C_{eq, k, i} + C_{bul, k, i}, \]  

(2)

where \( C_{sal, k, i} \) – specific costs for the salaries of repair workers, taking into account accruals, performing the k-type of work in the i-th MTE, which have for 1 man-hours of labor, uah/man-hour; \( C_{eq, k, i} \) – specific equipment costs required to perform the k-type of work per 1 man-hour of labor, uah/man-hour. Specific costs take into account not only the cost of the equipment itself, depreciation deductions, its cost of installation, but also the cost of electricity; \( C_{bul, k, i} \) – specific cost of the building used to perform the k-type of work, per 1 man-hours of labor, uah/man-hour. Costs include depreciation deductions on building, cost on heating and electricity.

The cost of one man-hour of car maintenance and repair work at the MTE is determined:

\[ C_{1 m.h.} = (S_{sal} + C_{db} + C_{deeq} + C_{en.sys.}) / T_{MR}, \]  

(3)

where \( T_{MR} \) – annual volume of maintenance and repair work, man-hour; \( S_{sal} \) – the annual salary of a repair worker, uah; \( C_{db} \) – annual depreciation deductions on building, uah; \( C_{deeq} \) – annual depreciation deductions on equipment, uah; \( C_{en.sys.} \) – annual energy systems costs (energy, water, heating supply and oth.), uah.

\[ C_{1 m.h.} = (12 \times S_{sal} + C_{db} + C_{deeq} + C_{en.sys.}) / T_{MR}, \]  

(4)

where \( S_{sal} \) – monthly salary of a repair worker, uah; \( H_{sal} \) – accrual on salary, %; \( P \) – the number of employees, man; \( S_a \) – area of the building, m²; \( C^{\prime} \) – cost of 1 m² production area, uah; \( H^{deq} \) – rate of depreciation deductions on building, %; \( C_{eq} \) – cost of equipment, uah; \( H^{deeq} \) – rate of depreciation deductions on equipment, %; \( C_{1 m^2 energy} \) – specific energy costs per 1 m² of building per month, uah; \( x_p \) – the number of work posts or sets of technological equipment.

However, function (1) does not take into account the costs associated with the delivery of a car or repair fund for maintenance and repair.

Given the cost of shipping, the function looks like:

\[ C_{k, MTE, i} \leq C_{k, CSP, j} + C_{del}, \]  

(5)

where \( C_{del} \) – delivery costs for the j-th CSP.

It is advisable to create a production unit to perform the k-th type of car maintenance and repair work in the MTE, if the cost of 1 man-hour of the implementation in motor transport enterprise is less than the cost of 1 norm-hour of the implementation of the k-th type of work in the j-th CSP, including the costs, which are related to the delivery of a car or repair fund for car maintenance and repair at the CSP (pic. 2).
Pic. 2. Determination of the expediency of creating a production unit for car maintenance and repair in the MTE, taking into account the cost of delivery

\[
C_{\text{MTE}} + C_{\text{CSP}} + C_{\text{del}} 
\]

Pic. 3. Block diagram of the algorithm for evaluating the performance of production units on car maintenance and repair in the enterprise

Decision making the expediency of production units creation in MTE

Appropriate works are submitted for implementation to the nearest CSB

Printing of calculation results

THE END
As you can see from pic. 2, with increasing the distance of car delivery or repair fund to the CSP, the minimum amount of car maintenance and repair, in which the implementation of a specific type of work is economically feasible in the trucking company, gradually decreases.

Expediency of creating production units units for the car maintenance and repair at the enterprise is determined in the following sequence:

1) determine the annual volume of maintenance and repair work of the rolling stock as a whole at the i-th enterprise and at each production unit;
2) determine the required number of production workers in each k-th production unit of the i-th enterprise, number of work posts and lines of maintenance and repair, the necessary technological equipment is selected, areas of production buildings are determined;
3) determine the total cost of performing car maintenance and repair work in each k-th production unit of the i-th enterprise;
4) determine the cost of 1 man-hour of work on the car maintenance and repair in each k-th production unit of the i-th enterprise;
5) Compared the cost of work on the car maintenance and repair in each k-th production unit of the i-th enterprise with the cost of performing these works at other j-th enterprises (SCM, MTE, CSP), which are located near the i-th enterprise;
6) a preliminary decision is made as to the expediency of creating a k-th production unit for the car maintenance and repair at the i-th motor transport enterprise;
7) determine the cost of transportation of the car or its individual components from the i-th MTE to the j-th CSP, which account for 1 man-hour of work;
8) the cost of execution on car maintenance and repair work at the k-th production unit of the i-th enterprise is compared with the cost of performing these works at the j-th CSP taking into account transportation costs;
9) a decision is made as to the expediency of creating a k-th production unit for car maintenance and repair at the i-th motor transport enterprise.

The block diagram of the algorithm for determining the expediency of creating production units for car maintenance and repair in the enterprise is given in pic. 3.

5. Conclusions

To provide equal conditions of competition in the market of transport services the structure of production units in a motor transport enterprise should be different for small, medium and high MTE power and to determine the amount of car maintenance and repair.

The conditions for creating a car maintenance and repair unit in the enterprise are the minimum of the given expenses, in which implementation of a particular type of work is economically expediency in the specified enterprise. If it is not expediency to create any of the subdivisions, the corresponding works are submitted for implementation at the nearest MTE, SCM or other enterprise where these services are performed.

The estimation technique of work efficiency of production divisions for car maintenance and repair in motor transport enterprises is developed, which allows to perform calculations for MTE of different capacity.

References

Для досягнення поставленої мети в рамках виконаної роботи були використані наступні методи дослідження: аналіз процесів і явищ, гіпотетичний метод, математичне моделювання процесів, інтеграція з іншими науковими дослідженнями.

Умовами створення того або іншого підрозділу з технічного обслуговування та ремонту автомобілів в підрозділах є мінімум приведених витрат, за яких виконання конкретного виду робіт економічно доцільно в зазначеному підрозділі.

Розроблено методику оцінювання ефективності роботи виробничих підрозділів з обслуговування та ремонту автомобілів в автотранспортних підрозділах, яка дозволяє виконувати розрахунки для АТП різної потужності.
МЕТОДИЧЕСКИЕ ОСНОВЫ УСОВЕРШЕНСТВОВАНИЯ СТРУКТУРЫ ПРОИЗВОДСТВЕННЫХ ПОДРАЗДЕЛЕНИЙ АВТОТРАНСПОРТНЫХ ПРЕДПРИЯТИЙ

Благодаря разной структуре технической службы автотранспортных предприятий (АТП) малой, средней, большой мощности и объема работ по техническому обслуживанию (ТО) и ремонту транспортных средств, могут обеспечивать равные условия конкуренции на рынке транспортных услуг. Таким образом, первоочередной задачей при решении вопроса удовлетворения спроса на услуги по обслуживанию и ремонту транспортных средств является использование существующих производственных мощностей АТП различных ведомств, то есть необходиима трансформация ведомственных производственных инфраструктур в региональную структуру.

Используя предложенную методику для условий конкретного автотранспортного предприятия (АТП) позволит на основе численного значения критерии оценки эффективности выполнения работ по ТО и ремонту автомобилей определить рациональную структуру его производственно - технической базы (ПТБ). Это соответственно, повысит эффективность работы предприятия, оптимизирует ПТБ и поможет выявить перспективные направления взаимодействия транспортных предприятий и централизованных специализированных производств по техническому обслуживанию (ТО) и ремонту автомобилей.

В статье приведена методика определения целесообразности создания или содержания производственных подразделений по техническому обслуживанию и ремонту автомобилей в автотранспортных предприятиях. Объект исследования – формирование структуры производственных подразделений в автотранспортных предприятиях зависимости от объемов работ по техническому обслуживанию и ремонту автомобилей. Целью работы является повышение эффективности работы автотранспортных предприятий совершенствованием структуры производственных подразделений по обслуживанию и ремонту автомобилей. Для достижения поставленной цели в рамках проделанной работы были использованы следующие методы исследования: анализ процессов и явлений, гипотетический метод, математическое моделирование процессов, массовое наблюдение, статистическая обработка данных результатов экспериментальных исследований.

Условиями создания того или иного подразделения по техническому обслуживанию и ремонту автомобилей на предприятии является минимум приведенных затрат, при которых выполнение конкретного вида работ экономически целесообразно на указанном предприятии. При нецелесообразности создания любого из подразделений, соответствующие работы передаются для осуществления на ближайшем АТП, станции технического обслуживания автомобилей (СТОА) или другом предприятии, где выполняются эти услуги.

Разработана методика оценки эффективности работы производственных подразделений по обслуживанию и ремонту автомобилей в автотранспортных предприятиях, которая позволяет выполнять расчеты для АТП различной мощности.

Ключевые слова: автомобили, автотранспортные предприятия (АТП), производственно – техническая база (ПТБ), производственные подразделения, текущий ремонт (ТР), станции технического обслуживания автомобилей (СТОА), техническое обслуживание (ТО), ремонт, централизовано-специализированные производство (ЦСВ).

Ф. 5. Рис. 3. Лит. 13.