

Changes in Maintenance Services of Iron & Steel Plants

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Abstract

Both technical aspects and consequences of outsourcing as collapse of maintenance services at iron & steel plants are considered. The complex multi-function structure of iron & steel plant is rather attractive for implementation of outsourcing principles. The practical implementation causes failures in enterprise functioning, increase of management personnel, decrease in profitability. Not always separate parts of the enterprise can function as the whole enterprise. Introduction of additional coordinate department is required.

Keywords: *maintenance service, outsourcing, iron & steel plant, technical maintenance, repair*

Today, iron & steel plants of Ukraine are tended to implement outsourcing strategy in relation to maintenance departments. It is necessary to stress that in 90s of the 20th century there were unsuccessful attempts to found maintenance departments in the structure of metallurgical association. The purpose of this paper is to discuss technical aspects and consequences of outsourcing as collapse of maintenance departments of iron & steel plants. The general idea of all papers related to this subject is enthusiastic - expenses will be decreased, quality will be enhanced, and productivity will be increased as well.

We will start with definition of the term *outsourcing*. Outsourcing is when the organization transfers certain business-processes or production functions in service to the other company specializing in the appropriate area. Unlike technical service and support that are of single, incidental, casual character and are limited by fixed terms of execution, outsourcing is characterized by professional providing of regular performance of separate systems and infrastructure on the basis of long-term contract – not less than one year [1, 2]. It should be mentioned that long-term contract must be not less than one year, while service life of modern metallurgical equipment is 10-12 years and that of outdated equipment is 50-100 years.

The complex, multifunction structure of

iron & steel plant is rather attractive for implementation of outsourcing principles. The practical implementation causes failures in enterprise functioning, increase in management personnel, decrease in profitability. Not always individual parts of the enterprise can function as the whole enterprise, and introduction of additional coordinate department is required. At any enterprise, metallurgical equipment has various service lives, various conditions and accordingly various repair works are required. The terms of carrying out repairs in a greater degree should be determined by technology requirements. It is more effective to coordinate operations of maintenance departments within one dominant enterprise than between several associate enterprises.

At any iron & steel plant, maintenance services function to provide and restore operable state of equipment: mechanical, electric and power equipment, buildings and constructions. In this respect, the structure of maintenance service is of great importance.

The distinguished features of operation and repair of equipment at iron & steel plants are as follows:

1. Need in a great scope of repair works for the short period of time. In this conjunction, additional departments of the plant or outside enterprises are needed.

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2. The unique design of most metallurgical units requires development and implementation of individual repair technologies, creation of specialized tool and methods for determination and estimation of technical condition.

3. Rational life of modern metallurgical machines is 10-12 years. During this period of time there is deterioration in the current condition of equipment, and it is necessary to change equipment capacity, terms and types of specific repair works.

4. Availability of multi-way, significant-by-scope life-support systems - lubrication system, cooling system, ventilation system. These life-support systems need a constant attention on the part of maintenance services and preliminary repair works to be carried out.

5. The main requirement to metallurgical units is to provide design capacity with no failures. The failure in technology of metallurgical manufacture under emergency and off-schedule shutdowns causes major losses. This constantly requires taking immediate, emergency, often not ordinary measures upon maintenance or failure recovery of operable state of mechanisms.

6. The major effect of maintenance service quality upon a technical state of machines that is provided, first of all, by training of repair and operational personnel. The additional requirement is a constant improvement of quality performance of specialized operations on adjustment, monitoring and repair.

The dominant requirement concerning carrying out of repairs during planned shutdowns is not always possible to accomplish because of lack of information about technical state of equipment. Foundation of service centers specializing in technical diagnostics and equipment condition control is the main way to provide non-failure operation of metallurgical units. These service centers cannot be outsourced and perform periodic control. The constant work on monitoring the change pattern of technical state of mechanisms under effect of technological loadings, ageing processes and external repair effects is necessary.

The following structures of maintenance service are known [3-5]:

- *centralized* structure is intended to manufacture spare parts and to perform repair works by outsourced organizations: machine-building, specialized repair and installation services;

- *decentralized* structure where repairs are conducted by shop repair departments, whereas

equipment and spare parts are purchased, which requires a large warehouse of spare parts;

- *mixed* structure combines advantages of centralized and decentralized structures.

At decentralized form of structure, repair personnel is concentrated in industrial shops while material and technical resources – in department of Master Mechanic. The centralized form is characterized by the fact that all the material and technical resources and repair personnel are combined in department of Master Mechanic.

Today, most iron & steel plants have a mixed form of organization of repair manufacture under which each industrial shop has small workshops for making high-wear parts and required repair personnel. In the department of Master Mechanic, the specialized repairing shops as an initial step of centralization are provided.

The long-term operational experience of maintenance services of iron & steel plants has proved the advantages of mixed structure, namely, specialization of repair departments and personnel development; possibilities to change operatively the plan of work and to eliminate consequences of off-schedule shutdowns.

Under the real conditions, transfer of repair works to the third side is often conducted as follows [6]:

1. foundation of enterprise that specializes in equipment repair (usually absolute branch of the company);

2. training of appropriate personnel;

3. concluding of agreements that are in force between the dominant and affiliated company;

4. arrangement of supply.

The most complicated thing in the system of technical maintenance and repair is to ground a scope of work and volume of expenses. In view of specialized equipment group (for example, pumps, fans, hydraulic equipment), these issues can be solved with a definite level of success due to reservation. The main requirement is that the experts of specialized enterprise should repair one-type mechanisms. This enables to raise qualification, to reduce costs and to improve the quality of repair works performance.

Within the last decade, the use of outsourcing has increased and been widely used all over the world. Today, the European business gives contractors amount of works that is hardly a half of the world's outsourcing business [7].

Why did these tendencies turn out to be so successful in Europe?

In 70s of the 20th century, the centralized structure was rather popular abroad. This structure was based upon multi-branch network of spare parts warehouses, educational and consulting centers [8]. Initially, organization features of technical maintenance and equipment repair abroad were based on the following principles and strategy of periodical replacement of equipment (3-5 years) [8]:

1. Manufacturer is responsible for organization of maintenance service of machines and equipment during the whole period of operation.

2. High-quality technical maintenance is the key advantage when choosing the products offered.

3. Manufacturer provides maintenance service of equipment delivered during the whole period of operation until the complete appreciation. Especially, it is applied to a long-term period of 10-20 years.

4. Maintenance service system of manufacturer provides performance of the whole range of services: supply of spare parts, repair works, supply of engineering specifications, personnel training, study of total performance of machines and equipment, detection of advantages and disadvantages of mechanisms, upgrading. The scope of works is determined by customer on the basis of optimum volume of services offered.

5. High competence of maintenance service personnel achieved due to limited specialization and constant increasing of their professional level.

6. Organization of multi-branch network of maintenance service: repair centers, warehouses of spare parts, consulting centers. Organization and foundation of maintenance service network abroad demands major investments from the plant-manufacturer and is proved to answer expectations only in case of mass export of equipment.

7. Feedback regarding equipment state.

Such specialized enterprises as “Domnaremont”, “Energoremont”, “Spetsmontazh”, “Ukrenergochermet” have been successfully operating as a part of Ministry for Ferrous Metallurgy of the USSR and within the limits of certain region, constantly moving from one object to another.

Today, all above-mentioned enterprises do not have fixed scope of works that decreases personnel skill level. There are no criteria for quality estimation of repair done at the enterprises as well that does not permit detecting installation defects and explaining the validity of decisions accepted. It is necessary to specify that

metallurgical equipment has a certain “strength factor”, which ensures reducing and eliminating the volumes of maintenance service and repair. However, in the long term perspective, depletion of “strength factor” causes significant reduction of equipment service life. Therefore, performance of works related to maintenance service within a year demands smaller specific expenses than service during 10-year period.

The periodic service of equipment according to the plan approved is not always reasonable because of possible sudden changes in equipment condition. Maintenance by actual state is more promising.

Even insignificant disadvantages in organization of timely and quality maintenance service and repair lead to huge losses for individual enterprises and branches. Therefore, the dominant enterprise, transferring several functions to outsourced enterprises, should reserve functions of equipment condition control, planning of repairs, estimation of quality of repairs and functions of preliminary planning of enterprise development. For this purpose, within the limits of dominant enterprise, it is necessary to ensure functioning of duty, repairing, engineering personnel, technical supervision and diagnosis services.

Hence, for successful implementation of outsourcing strategy in relation to maintenance services, it is required the developed structure that comprises:

- mobile teams of highly skilled experts in hydraulics and automation, mechanics;
- educational centers – for training and retraining of maintenance service experts;
- warehouse is the most important constituent, in most respects providing fast, immediate and quality repair;
- repairing factory or centralized workshops that repair and adjust equipment.

Otherwise, implementation of outsourcing strategy will lead to collapse of maintenance services at iron & steel plants.

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Изменения в ремонтных структурах металлургических предприятий

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Рассмотрены технические аспекты и последствия аутсорсинга как разрушения ремонтных структур металлургических предприятий. Сложная, многофункциональная структура металлургического предприятия весьма заманчива для реализации принципов аутсорсинга. Практическая реализация приводит к нарушению функционирования предприятия, увеличению штата управленческого аппарата, снижению рентабельности. Не всегда части целого могут воссоздать функции целого, необходимо введение дополнительного согласующего подразделения.