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One of possible variants of the organization for recycling lubricate cooling of technological means for small businesses

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Abstract. In the paper we analyze the application lubricate cooling technological environment in the processing of various materials in the past century greatly have increased cutting speed and respectively, has increased productivity [1]. Today, none of production in which anyway is used metal cutting machines of all types (milling, turning, grinding, drilling, etc.) is not without lubricant cooling technological liquid which in turn are designed to reduce cutting force and the load on metal cutting machine tools and machined parts in order to increase durability machine tools and reduce errors of processing details and also in resource energy saving. When using lubricate cooling technological environment reduces the temperature in the cutting zone resulting in higher tool life and the preservation of the surface structure being treated reducing wear of metal parts of the machine. Typically, lubricant cooling process fluids is used without replacing as long as possible not yet beginning to negatively affect the quality of process. However life expectancy lubricate cooling technological environment is limited. According to existing normative acts every kind of lubricate cooling technological environment through certain time must be deleted by from the system and subjected to a recycling. Lubricate cooling technological environment must be disposed of for the following reasons: occurs the microbial and the mechanical pollution cutting fluid, free oil impairs operational characteristics cutting fluid and increases consumption.

1. Problem

Through the use of cutting fluids in the processing of different materials over the past century have significantly increased cutting speed and therefore increased productivity [1]. Nowadays no one manufacture in which, one way or another, used cutting machines of all kinds (milling, turning, grinding, drilling, etc.) can't do without, the so-called COTS - lubricating and cooling process fluids, which in its turn are intended to reduce the cutting force and the load on the metal-cutting machine tools and the work pieces as to increase durability and reduce the error machine processing parts, as well as energy savings. When using cutting fluids - decreases the temperature in the cutting zone,



which leads to increased tool life and preservation of structure of the treatment surface, reduced wear of metal parts of the machine. Usually cutting fluids used without replacement as long as possible until the quality of cutting fluids does not begin to adversely affect the quality of the process. However, life expectancy is limited to cutting fluids. According to existing normative acts every kind cutting fluids should be removed after a certain time of the cutting fluids feed system and subjected to recycling. Workers who are in regular contact with contaminated cutting fluids can get serious diseases of internal organs and skin, cause allergies. Spent cutting fluids causes corrosion processes machined parts and manufacturing equipment. Cutting fluids role in the processing of materials is not reduced at the beginning of the 21st century. Data appeared about new cutting speeds fluctuating within the 1000-6000 m/min. The recommendations on the use of new cutting materials, there is a requirement that the use of these cutting materials is not permitted without cutting fluids. Given the use of high speeds and capabilities of modern machine tools (machining centers with a large number of tools), you can create small and medium-sized businesses with a small number of machinery equipment and production of a large range of products. But this is business of the future.

In the past 25 years after the Soviet collapse, most large industrial enterprises in the CIS countries went bankrupt or were transformed into small enterprises of small or medium-sized businesses. The number of machinery equipment in enterprises decreased significantly. For example, in Moldova, the biggest company in the field of engineering is no more than 100 machines. For disposal of cutting fluids [1, 4] proposed the following methods: 1) chemical, physico-chemical; 2) Thermal, evaporation; 3) The membrane purification, filtration; 4) centrifugation; 5) The sorption; 6) combinations thereof. If we analyze these methods we can see that they are based on different principles and implement the necessary recycling processes on different hardware. So a number of companies [2] offer several methods of disposal of cutting fluids and accordingly the supply of various equipment for the disposal of various types of cutting fluids. And from the enterprise requires a clear answer, what components must be disposed of. We believe that a small business with 20 - 40 does not have a working professional, thoroughly versed in matters of recycling cutting fluids.

By studying the problem of disposal of cutting fluids, we found [3] an example of a decision problem of recycling cutting fluids in a big city like Moscow. The volume of annual deliveries cutting fluids in Moscow is over 25,000 tons. In the Moscow Government is concerned that small businesses are not able to deal with the disposal of cutting fluids and accepted the proposal to organize a single center for the development of scientific research and experimental - design works and the development of new technologies for emulsion production, as well as equipment for disposal, recovery and recycling of used lubricating -ohlazhdayuschih liquids. In the Moscow Government is concerned that small businesses are not able to deal with the disposal of cutting fluids and accepted the proposal to organize a single center for the development of scientific research and experimental - design works and the development of new technologies for emulsion production, as well as equipment for disposal, recovery and recycling of used cutting fluids. In this article, we do not set the task to assess the effectiveness of a particular method. We just emphasize that none of these methods does not provide a complete recycling of waste cutting fluids [1, 4]. It follows that for the full utilization of cutting fluids in the enterprise need to use several methods for disposal. To use several methods, the company should have trained professionals, both in art and in the field of chemistry and different technologies. It is necessary to set up a laboratory to determine the maximum permissible concentration of the various components. It is known that there is a disposal problem worldwide. And usually means for waste management are invested in large cities and major regional centers. But a large part of the population lives in small towns and the problem of waste disposal for small towns is relevant, as well as for large cities. Due to the small enterprises waste recycling capacity for small towns is not economically profitable to build. On this basis, the Republic of Moldova initiated several projects on waste disposal for several areas (covering about 200,000 people.). Within the framework of these projects is planned to build a unified ambulance drives in one place for a number of settlements. With all the localities vehicles using waste will be dumped in the common sanitary storage. The idea is to save material resources at the disposal of household waste.

2. Research methods

To study the problem of disposing of cutting fluids in the Republic of Moldova, we used a statistical method, which is one of the known methods of research. The statistical authorities of the Republic of Moldova given that in the Republic there are about 5000 companies in the manufacturing industry. More than 4200 companies are privately owned, including 200 enterprises with foreign capital. These enterprises employ about 100,000 workers.

On the basis of these data, using different calculation methods aggregated amount of equipment, we came to the conclusion that the Republic of Moldova can work about 25 000 - 40 000 machine tools. Naturally, all of these machine tools use different types of cutting fluids. This can be judged on the basis of that is in the Republic, in addition to pre-existing companies were more than 200 companies with foreign capital. For each type of cutting fluids need to develop its recycling technology. And we put the question-whether a small company is able to organize the disposal of cutting fluids collected from the work of 20 - 30 machines?

3. Research results

As a result, the statistical data were obtained on the number of investigations of the imported quantity concentrates for preparing cutting fluids to the Republic for 7 years. These data are shown in Fig. 1.

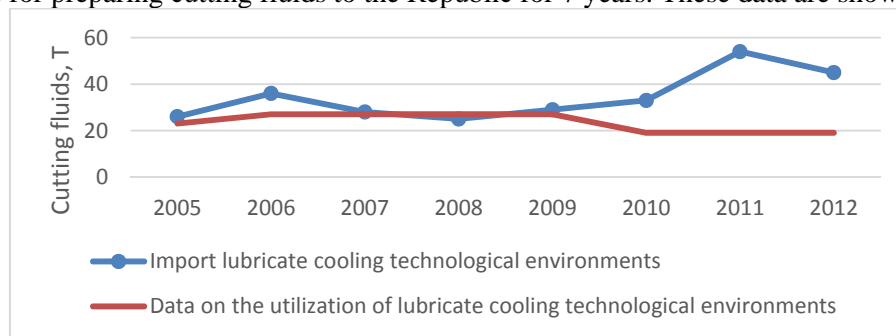


Figure 1. Imports into the Republic of Moldova concentrates for preparing cutting fluids data and reports on their utilization.

As you can see, in the republic for a long time imported an average of 35 tons concentrates for preparing cutting fluids (curve points). Consequently, each year the same number of concentrates for preparing cutting fluids must be disposed of and must not fall into the water basins of the rivers Prut and Nistru. Discharge of waste into sewer cutting fluids harms the environment and ultimately to all residents of Moldova, Ukraine and Romania using the water of the two rivers for drinking. The rivers Dniester and Prut provide more than 80% of the needs of the population and economic complex of the Republic in the water. These are the only river water that is safe to drink. Although there is some evidence that drinking water is contaminated in Moldova by 90%, without further explanation what the components. On the other hand, we used statistical data on utilization of cutting fluids (curve without points. Fig. 1), which shows that not all volumes imported cutting fluids recycled. Analysis of the data plots reveals that part of the Republic received cutting fluids not disposed (curve without points) concentrates. There is in our view a few options: 1) option - part of the enterprises do not know what it is necessary to account for the disposal of industrial waste. 2) option - part of the cutting fluids concentrates has not been used. On the other hand it is possible to account for the disposal, but do nothing for recycling. Since we know the situation in most industries, we can say that no one entity is not engaged in recycling of used cutting fluids. All imported cutting fluids in volume, according to the graph in Fig. 1 merges into storm sewers or fecal.

This we can confirm the research conducted by ecologists [5, 6] in the implementation of the alloy expeditions group of environmentalists on the rivers Prut and Nistru. We've simplified graphics part of the studies authors [5, 6] without prejudice to the science. From these studies it follows that in the analysis of water, after all the cities 1, 2, 3, 4 (in our charts here cities replaced the figures) along the

rivers Prut and Nistru (Figure 2 and Figure 3) increase the weight content of the following components: heavy metals, oil products and phenols.

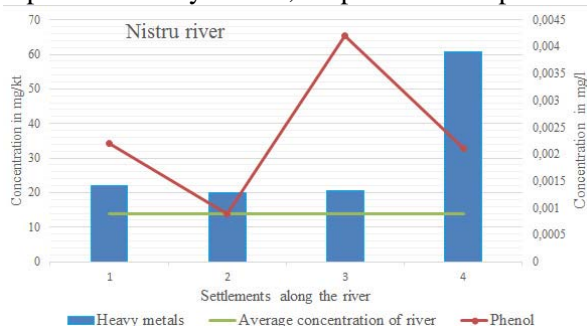


Figure 2. The content of heavy metals and phenols.

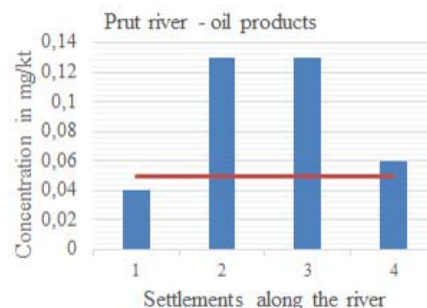


Figure 3. The content of oil products

These data demonstrate that in the cities at the expense of the productive activities in the rivers merge water production waste without recycling. On the other hand, based on analysis of water in the Dniester and Prut can not give an answer to the question of what the company throws in waste water basins cutting fluids. It is necessary to take into account the fact that the expedition carried out tests for harmful substances in the water for a limited range of substances. The data on the components included in the cutting fluids omitted. According to [4] in cutting fluids include the following components: mineral oil, emulsifiers, corrosion inhibitors, biocides, antifoaming agents and phenol. These studies showed that the water in the river increases the concentration of a number of harmful substances such as phenols and oil products during the course of the rivers, which are part of the cutting fluids.

4. Conclusion

We propose to establish in the Republic of Moldova within a number of regional centers for waste cutting fluids waste. In the initial conditions, the job should head the Ministry of Environment, which is due to the budget-could be built to start one such facility. In the future, studying the work of all industrial companies could collect certain batch of spent cutting fluids and bring them to process in this area. It is understood that this processing will continue to be made for a fee. But we believe that this fee will be less than if every small business would be organized recycling cutting fluids at home. On the other side of the joint efforts to contribute to the purification of the water basin from the harmful chemical elements and compounds. This would lead to the purification of drinking water for residents of Moldova, Romania and Ukraine.

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