3. *Выполняется диспетчеризация с учетом требований к ресурсам*, при этом для решения данной задачи не требуется модификация алгоритмов диспетчеризации задач.

Таким образом, предложение механизмы интеграции средств защиты позволяют гибко добавлять новые, в том числе адаптивные, средства защиты в среду распределённых компьютерных систем.

ЛИТЕРАТУРА

1. Von Welch Security for Grid Services. Von Welch, Frank Siebenlist, Ian Foster, John Bresnahan, Karl Czajkowski, Jarek Gawor, Carl Kesselman, Sam Meder, Laura Pearlman, Steven Tuecke. // http://toolkit.globus.org/alliance /publications/papers/GT3-Security-HPDC.pdf

2. Czajkowski, K. A Protocol for Negotiating Service Level Agreements and Coordinating Resource Management in Distributed Systems Czajkowski, K., Foster I., Kesselman C., Sander V. and Tuecke S., SNAP:. 8th Workshop on Job Scheduling Strategies for Parallel Processing, 2002.

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JUSTIFICATION OF CHOOSING RECOVERY METHOD FOR CYLINDER LINERS OF AUTOTRACTOR ENGINES

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Abstract. *The article deals with the choosing of promising recovery method for cylinder liners of autotractor engines. The results of the study of wear resistance of cylinder liners using a variety of process liquids are presented.*

At the present stage of repairing facilities repair shops, dealerships, technical service company solving important and responsible tasks for the maintenance tractor fleet in working condition and periodic machine resource recovery. One of the key issues here is the using of progressive technological processes for restoration parts that increase resource of refurbished machines and therefore, increase durability and technical readiness of engines.

Analysis of the literature shows that the life of the engine ensures, first of all, by the cylinder group that can be replaced with new or refurbished during repairing process.[1].

Wear of the cylinder group depends on the material of details, the clearances size, hardness of the rubbing surfaces, grease and fuel quality, vibration speed, etc.

Therefore, to improve the engine life is necessary to reduce friction losses, to improve wear resistance of rubbing surfaces, lower surface roughness, to improve lubrication of surfaces, etc.

Following defects are found in the cylinder liner during operating:

- wear on the inner surface;
- wear on the collar and the lower reference landing zones;
- cavitation destruction of the outer surface;
- deposits of scale.

However, the main defects of cylinder liners are internal wear of surfaces.

Existing methods of restoration and strengthening of the internal surface of cylinder liners can be divided into two groups: boring under the repairing size and restoring the nominal size.

Figure 1 shows the comparative cost of different methods of details machining and roughness, which is achieved in this case [2]. In providing low cost treatment roughness increases sharply, and the lowest cost consistent processing boring and finish turning. Along with this roughness and high performance are achieved.

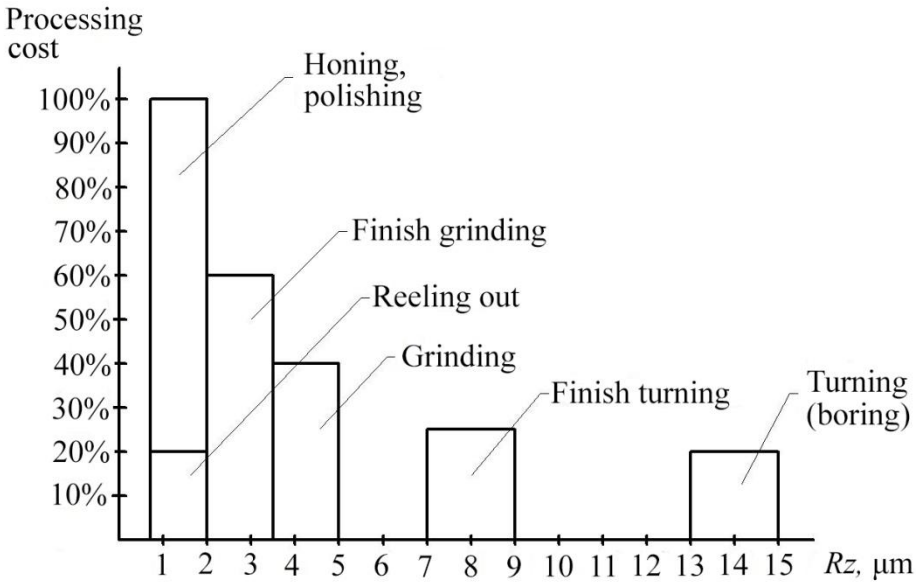

Fig. 1 – Economic valuation of treatment methods

Among the technological processes for recovering of cylinder liners in repair enterprise worthwhile perspective combined method of treatment: boring, superficial plastic deformation with drawing antifriction coating.

Application of antifriction coating is carried out at the finish nonabrasive anti-friction treatment (FNAT). The essence of FNAT is applied by applying a thin layer of metal that has high antifriction properties on the surface during friction. The reduced wear wire surface can be explained by two factors: first - a strengthening of the surface layer, the second - is the presence of a copper plastic coating that reduces not only friction, but also acts as a solid lubricant by friction. Surface hardening of cylinder liners while applying antifriction copper coating reduces the running-in of engine parts and reduces their initial wear.

During processing technology using liquids to form antifriction coating. Protective antifriction film, that forms during processing, helps to reduce the time of running-in of cylinder liners and reduces further deterioration. As noted, significantly reduces surface roughness. As the process liquids in studies were selected several modern solutions for finishing nonabrasive anti-friction treatment. Using of special technological liquids allows you to combine several processes. At first, surface-active substances that included in the basis of these liquids reduces friction. Secondly, active components of technological liquids form the anti-friction anti-wear coating.

Research has shown that ultrafine powder of minerals based on then serpentine is effective. During sliding using of this composition forms metal ceramic coating that can reduce wear by 40% and roughness by 60% during the running-in period.

While holding out the researching we used samples of the cylinder liners whose surface is treated with honing bars ACM 20/14 MC 1 to get roughness R_a = 0,32 microns.

In a case of opposite sample we used clips made of material from piston rings processed by grinding to get roughness R_a = 2,4 microns.

Experimental samples after boring were processed using the following solutions:

1) Serpentine based solution (solution 1);
2) Copper chloride – 5%; Soluble – 5%; Glycerin – 45%; Diesel – 45% (solution 2);
3) Copper glycerate – 50%; Ricinoleic acid – 5%; Diesel fuel – 45% (solution 3).

Thus, were prepared four series of samples for testing on friction machine MI-1M. Each experiment was performed on three pairs of samples. Surface plastic deformation of cylinder liners were carried out on boring machine, the rolling was set in spindle and the liner fixed in the adaptation. Processing modes: speed n = 500 min^{-1}; the value of feed S = 0,01 mm/rev; tension Δ = 0,l mm. Technological liquid in zone of deforming elements (rollers) was served via lubricator.

Testing time 60 minutes with the rotation speed of 500 min^{-1} and a load of 400 N. Wear samples was determined by the change in mass of samples during tests. Mass of rollers was determined on an analytical balance model VLA-200 d-M (ADV-200M) with accuracy of $1x10^{-3}$ gr.

The test results for wear shown in figure 2. Analysis of test results of samples in oil M-8-B shows that the largest cumulative depreciation observed in a pair of friction pads after honing. Friction couples after solution application for anti-friction coatings have less wear compared to honing pads by 16…28%.

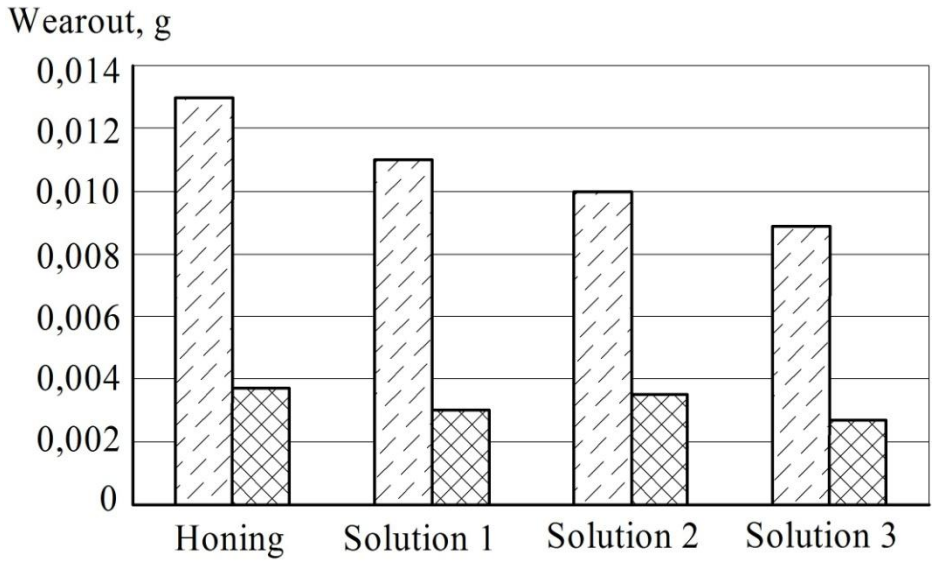

Fig. 2 – The results of wearing test of samples:

- cylinder liner; - piston ring

From the samples, that was studied, shows the best result of finishing solution 3. This can be explained by the presence in the solution of surface-active substances that contribute plasticizing friction surface and the formation of a more favorable texture-oriented crystals, hardened friction surface parts, forming composite friction surface which contains copper atoms a consolidated structure of the surface layer of metal.

Thus, the recovery cylinder liners using this method of lubricating fluid technology provided reduced wear up to 28%. The most effective technological solution here, as studies have shown, there is a solution based on glycerate copper.

REFERENCES

1. Reduction of machine parts / [F.Panteleev, V.Lyalyakin, V.Ivanov, V.Konstantinov]; ed. V.Ivanov - M: Mechanical Engineering, 2003. - 672 p.

2. Y.Autun Progressive methods of deep hole machining / Y.Autun, N.Smolnikov, N.Olshansky - Volgograd: VSTU, 2003. - 136 p.

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