WELDING MATERIALS USED IN THE RECOVERY OF CORRODED DETAILS IN THE CONTACT WELDING METHOD

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Abstract

In this article, the results of the research on the resource acquisition of the soil-working flat parts are presented, and during the implementation of these studies, it was envisaged to conduct research on the welding materials used in contact welding. The obtained results were analyzed and necessary powdery materials were selected and composition was based.

Abstract

In this state, the results of the research and the increase in the resource of the flat-detail soil-processing machine, and the implementation of the research and the implementation of the study of the welding material, used in contact welding, are presented. Obtained results by analysis, selection of necessary powder-coated materials and established composition.

Abstract

In this article , the results of the study and increase in the resource of a flat-piece tillage machine, as well as the study and study of the welding material used in resistance welding are presented. The results were obtained by analysis, selection of the necessary materials for powder coating and the established composition.

Keywords: flat details, recovery, contact welding, soldering, composite material, solid alloy, abrasive particle, resource.

Enter. In the following years, composite materials began to be used in the production of weld layers, which are very important in the restoration and improvement of machine details. The use of composite materials in the technological process of restoration of damaged parts of agricultural machinery is considered one of the new trends in improving the quality of restored parts.

In the information provided in a number of literatures, it is reported that scientists in countries such as Japan, Canada, USA, Russia, Ukraine, Austria, Germany, Bulgaria, Belarus have created a composite layer using metal powders [1; p. 24].

The reason for this is that today, the use of powdery materials for coating the working surfaces of details is one of the rapidly developing directions. They are mainly used in coating methods such as welding coating, gas thermal spraying, metallization. They use the invaluable properties and properties of powdery composite materials.

Free and shaped powdery materials belonging to the following groups are used in this [1; 25 p., 2; pp. 612-620].

1. Contains chromium and another alloying elements has been iron powders .
2. Nickel, nickel chrome and cobalt- based by itself fluxing powdery materials .
3. Metalalloyspowders .
4. Puremetalspowders .
5. Carbide of metals and oxides based on powders .
6. Powderypolymermaterials .
7. Mechanicalmixturesofpowders .
8. Powderycompositematerials .
9. Powderytapesandwires .
10. Heat up formed tapes . They usually are rolling the way with is prepared .
11. Powdery of materials layer in getting promising from directions one work release from waste use is considered[1 ; p. 25-30] .

Thus, it can be concluded that today a wide range of powdery materials have been created to cover the working surfaces of details. Many of them are mass produced.

A.V. Polyachenko [3], I.E. Ulman [4], M.N. Farkhshatov [5], R.N. Sayfullin [6], M.D. Banov [7], K.Z. Kasimov [1,8], V.I. Zrulin [9], R. Latipov [10], N.V. Serov [11], G.R. Latipova [12], A.N. Shitov [13] and others conducted research. In these studies, special attention is paid to the mechanism of formation of the weld layer and the external appearance of the layer. The main reasons for paying such attention are the fact that the layer to be welded should be thin, the appearance of the surface, its topography, defects, etc. It is noteworthy that A.V.Polyachenko, M.N.Farkhshatov, K.Z.Qasimov, R.N.Sayfullin focused on transferring a mixture of metal powders to the welding zone. As a result of freely transferring such a mixture to the welding zone, it is not possible to obtain a homogeneous and uniform weld layer, and it is not possible to use a cooling liquid.

The analysis of the results of the above-mentioned studies showed that the weld layer obtained in them ensures that the corrosion resistance of the details is higher than the new one. But it has been shown that insufficient researches have been carried out on increasing the resource of powdery composite materials formed in them by contact welding on the working surfaces of flat parts.

Composite materials for restoration of bent parts

The working bodies of agricultural machinery operate in environments where abrasive particles are involved, which are observed in the working conditions of many details. Abrasive wear is the main factor that limits the life of machines. The type that has the greatest effect on machine details in abrasive grinding is quartz grains, their maximum hardness is 12000 MPa.

The abrasiveness of hard particles is explained by their ability to affect the outer surface of details (scratch, deform, etc.). This property of abrasive particles is expressed by the level of formation of contact stress by them on the outer surface of the details.

In the process of impacting the quartz particle on the surface layer of the detail, it breaks down without plastic deformation, it occurs as a result of its brittleness. Therefore, the maximum stress on the contact surface is determined by the Hertz formula [14,15,16]:

$$\sigma_n = 0{,}418\sqrt[3]{\frac{E\cdot P_i}{R_i^2(1-\mu^2)^2}},(1)$$

where σ_n *is* tension, N/mm^2;

E is the modulus of elasticity of abrasive particle material, *Pa;*

P_i - the amount of limiting load that the first particle can carry until it breaks, *N;*

R_i- conditional radius of the first particle in contact with it on the surface of the detail, *mm;*

μ *is* Poisson's ratio.

Other things being equal, the magnitude *of* P_i depends on the hardness of the workpiece material in contact with the abrasive particle. If the part is made of soft material, the abrasive particle will sink into its surface without disintegrating.

As a result of rubbing the material on abrasive paper, it was found that there is a certain relationship between the hardness of the detail material and the bending resistance, which depends on the ratio N_m / N_a *between the microhardness of the material of the working surface of the detail* N_m and the microhardness of the abrasive particle N_a.

If this ratio is less than 0.6, there is a linear relationship between flexural strength and microhardness, and when the ratio is greater than 0.6, there is a sharp increase in the material's flexural strength.

Many parts of cars are made of structural materials. Their hardness is more than two times less than the hardness of quartz abrasive. That is why it is important to cover the working surface with a layer whose hardness is higher than the hardness of quartz in the fight against the bending of machine parts.

Under abrasive wear conditions, increasing the hardness of the part surface layer material to a level close to or higher than the hardness of the quartz particle leads to a change in the wear mechanism and, as a result, a sharp increase in the wear resistance of the part, tens or even hundreds of times.

The above-mentioned considerations lead to the conclusion that it is necessary to cover the working surfaces of the parts of machines with abrasive friction with a layer of hard alloy.

This can be seen by the following formula of P.N. Lvov, which expresses the relative bending resistance of the welded layers [17]:

$$\varepsilon = \frac{(1-\eta_И)\gamma_0 H_{\mu,И} + 0{,}82\eta_И \gamma_К H_{К,И}}{(1-\eta_Э)\gamma_0 H_{\mu,Э} + 0{,}82\eta_Э \gamma_К H_{К,Э}}, \quad (2)$$

where ε- coefficient of resistance to relative bending;

η_I, η_e - the portion of the surface of the tested and reference samples occupied by solid carbide alloys, respectively;

γ_0 is the coefficient, which has a value of 0.185 for ferrite and 0.206 for pearlite;

N_μ- microhardness of tested and reference samples, Pa;

N_k - microhardness of hard alloys, Pa;

γ_k is a coefficient, which is up to 0.218 for iron and manganese carbides, and up to 0.231 for hard alloys with carbides.

It can be seen from the given empirical formula (2) that the resistance to bending of the welded layer depends on the amount of carbides in it. According to this conclusion, V.N. Vinokurov [18] tested the creep resistance of weld layers obtained from alloys such as T-620, BX, "Stalinit", "Sormayt" No. 1, KBX, "Relit" compared to L53 steel, and "Relit" alloy (a binder containing 60% tungsten carbide and the rest low-carbon steel) found to have the highest flexural strength.

Summary. From these, it is concluded that in order to increase the resistance to abrasive wear of the parts being restored, it is necessary to use composite materials containing hard alloys. When welding these alloys to the working surfaces of the parts, their structure should be preserved as much as possible, without allowing the carbide constituents to break down. This demand is mostly satisfied by the method of contact welding, which is carried out with the help of a special device, and covers the bending-resistant material on the working surface of the bent parts by means of adjustable current pulses.

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