TECHNOLOGY OF REPAIR OF PARTS OF AGRICULTURAL MACHINES, EQUIPMENT WITH COMPOSITE MATERIALS

Melibaev M
Associate professor, Namangan Engineering Construction Institute Namangan, Republic of Uzbekistan

Negmatullaev S.E
Associate professor, Namangan Engineering Construction Institute Namangan, Republic of Uzbekistan

Nishonov Farkhodkhon
Namangan Engineering Construction Institute Namangan, Republic of Uzbekistan

Abdirimov Behzod
Student, Namangan Engineering Construction Institute Namangan, Republic of Uzbekistan

Annotation. This article provides information on the technology for the restoration of worn parts during the operation of agricultural machinery and equipment, on the example of the processes of changing the working surface of tillage units, the technology for the restoration of a new powder composite material by resistance welding.

Key words*:* machine, detail, restoration, wear, repair, service life, shaft, composite material, welding.

It is known that when increasing the abrasion abrasion resistance of parts of agricultural machinery and equipment, it is recommended that the hardness of the working surface of the parts be higher than the hardness of the abrasive particle. Most of the abrasives found in the soil are composed of silica-based sand particles. Its hardness is 8000-11000 MRa. The hardness of steels from which the working parts are made is up to 8000 MRa, only the hardness of the iron-manganese complex alloy is 12000-14000 MRa. The hardness of chromium carbide is 15700 MRa. Therefore, parts manufactured in European countries are made of manganese and chromium-based alloy steels.

In order to increase the working resource of details, the Russian scientist A.Sh. Rabinovich recommended welding of Sormayt-1 powder alloy. Welding a corrosion-resistant layer on the surface of the workpiece is an effective method to ensure its long-term performance. Some of the welded equipment parts are considered to be self-sharpening. In this case, the shape of the profile and the sharpness of the blade are preserved, along with the erosion of details.

Typically, the thickness of the welded layer does not exceed 2.5 mm, and the hardness is HRC 50-58. It is allowed to use 15GS steel instead of L53 steel, which is the base metal of self-sharpening workpieces.

However, due to the shortcomings of the technology of welding of powdered materials on the working surfaces of abrasive parts, such as "Sormayt-1", and the simplicity of the method of electric arc welding and its use in various production conditions T-590, T-620 The production of coated electrodes such as These electrodes are designed for welding and coating of parts operating under abrasive wear and small impact loads.

Welding of T-590 electrode is carried out in alternating current in reverse and inclined positions and in reverse polarity AC. It allows the formation of a weld layer that provides high abrasion resistance under abrasive conditions with abrasive materials. The welded layer is prone to the formation of microcracks that do not degrade the performance properties of the parts.

The layer welded with T-590 electrode contains 3.2% of carbon, 1.2% of manganese, 2.2% of silicon, 25% of chromium and 1.0% of barium. Its alloying elements form high-hardness carbides and borides from the welding process. This creates a heterogeneous structural layer on the working surface. This heterogeneous structural layer alters the abrasive erosion mechanism and resists the occurrence of microcracks by scratching the surface of the abrasive detail. Therefore, the working part covered with such a structural layer has a high resistance to abrasive abrasion. In order to form a heterogeneous structural layer on the working surfaces of the parts, it is recommended to treat them with chemical-thermal treatment or welding with modern composite materials.

The compositions of the powder materials selected for welding and the hardnesses they can provide are given in Table 1 above.

The hardness of the welded layer is one of the main indicators that ensures the wear resistance of the parts in several types of wear.

Experiments to determine the hardness of the welded layer used a certain amount of mixtures of powdery composite materials.

The results of the experiment showed that as the volume of the functional filler in the composite material increases, the hardness of the weld layer increases to 63 units on the HRS scale (Figure 1).

It was found that the total hardness of the resulting weld layer also increases with increasing the amount of hard alloys such as carbide, boride in the composition of the powder composite material. This condition continues until the amount of hard alloys in the weld layer reaches 50… 55%. The reason for this is a flat located spherical solid

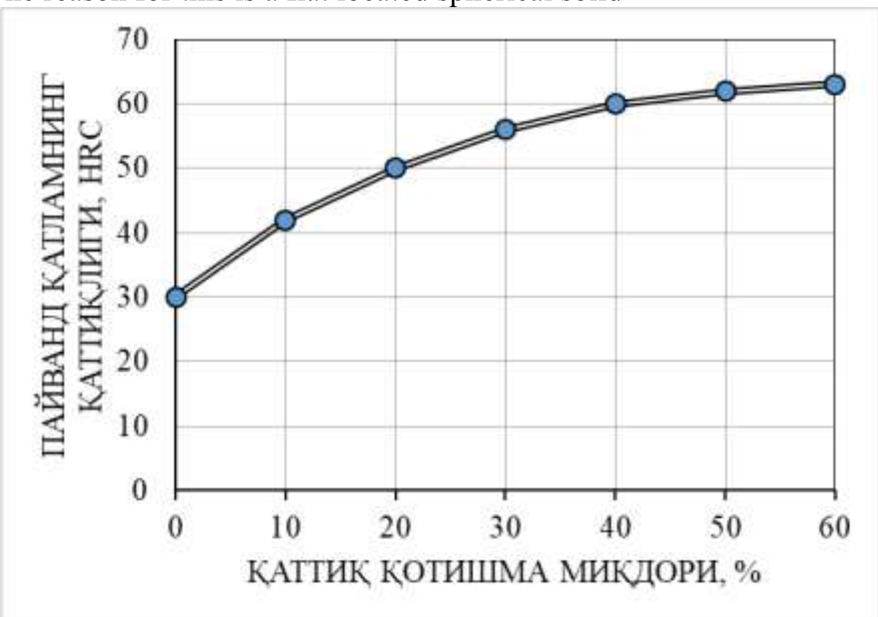

Figure 1. Graph of the dependence of the hardness of the weld layer on the amount of solid alloy in the powder composite material

can be explained by the fact that the volume of the gap between the alloys is around 47%. Hence, the above amount will be sufficient for the solid alloys that retain their shape in the composition of the composite weld layer to cover the surface of the layer evenly. The area occupied by hard alloys on such a surface obtained after polishing is 80-85%, or as a result of an increase in the amount of solid alloy in the weld layer from 0 to 50%, its presence on the polished surface of the layer is maximized. This ensures an increase in the overall stiffness of the weld layer and consequently the corrosion resistance. When the amount of hard alloys in the weld seam reaches 60-65%, the appearance of macro and micro cracks in the weld seam was observed.

Metal with a liquidus temperature higher than the liquefaction temperature of iron (1539 0S) is referred to by the conditional name "difficult-to-melt". The following table shows the subsoil quantities of some elements used in machinery, their properties, and their approximate prices on the world market.

Table 1

The amount of some elements in the earth's crust and their properties

The name of the metal	Liquidus temperature, ^{0}C	Density, г/см^3	The amount in the earth's crust, %	Approximate price, USD / kg
Mis	1083	8,94	0,01	15,7
Titan	1668	4,54	0,61	39,4
Iron	1539	7,87	5,1	0,76
Aluminum	660	2,7	8,0	3,3
Chrome	1857	7,19	0,03	14,9
Tungsten	3422	19,3	0,00013	54,5
Cobalt	1495	8,9	0,004	39
Nickel	1453	8,9	0,018	13,2
Manganese	1244	7,21	0,03	4,5

The annual production of basic materials in the world is as follows: steel - 1 billion. 700 mln. tons, construction cast iron - 1 billion. 170 mln. tons, aluminum - 15.3 mln. tons, mis- 23.5 mln. tons, chromium (including chromite and crocoite) - 14 mln. tons, nickel- 2.15 mln. tons, tungsten - 50 thousand tons, titanium (mainly titanium 2 oxide) - 4.5 mln. tons. In recent years, the production of composite and powder materials has remained the largest growth rate.

The distribution of this or that metal in the earth's crust is a property in terms of its applicability. It is possible to plan future use of common and sufficiently mined metal and its alloys.

From the table, titanium is the most abundant in nature among metals with a higher liquefaction temperature than iron, followed by chromium. Therefore, titanium and chromium, which can form hard alloys, are the most suitable for our research.

Titanium is widely distributed in the earth's crust. Titanium has a number of properties that are preferred over other metals, which has led to an increase in the industrial use of titanium. In particular, modern planes and space rockets are unimaginable without titanium. However, to date, titanium has not been used sufficiently to increase the wear resistance of parts operating under friction conditions. The density of titanium carbide (TiC) is 4.93 g / cm3 and the liquidus temperature is 3260 0S.

Chromium, especially its alloys, is widely used in engineering. This can be seen from the annual production of chromite along with chromium. Chromium forms three different carbides with carbon, and six with barium. Chromium is widely used to improve the various properties of metals. Although chromium is less than titanium in nature, its production is three times that of titanium, and chromium is widely used in industry due to its low cost of mining and processing of chromium alloys. The density of chromium carbide (Cr3C2) is 6.68 g / cm3 and the liquefaction temperature is 1890 0S.

The unique properties of tungsten keep it at the level of the most needed material today. However, the scarcity of tungsten, its cost, the tensile strength of tungsten alloy welded parts is tens of times higher than that of refined steels, and the ever-expanding field of application in the national economy added it to the list of metals that have no prospects in recovering corroded parts. The density of tungsten carbide (WC) is 15.60 g / cm3 and the liquefaction temperature is 2720 0S.

Carbides and borides of titanium and chromium are the most suitable materials as the curing phase of hard alloys formed by heating in terms of their properties, the degree of dispersion in nature, and price. Of these, chromium is almost three times cheaper than titanium, and the large volume of production makes it advisable to use it in the restoration of parts of agricultural machinery.

References:

1. Негматуллаев, С. Э., & Кенжабоев, Ш. Ш. (2021). ОСОБЕННОСТИ ТЕСТОВОГО КОНТРОЛЯ ПРИ ИЗУЧЕНИИ БЩЕПРОФЕССИОНАЛЬНЫХ ДИСЦИПЛИН ТРАНСПОРТНЫХ НАПРАВЛЕНИЙ. In *Современные автомобильные материалы и технологии (САМИТ-2021)* (pp. 224-227).
2. Ботиров, А. Г., Негматуллаев, С. Э., & Мансуров, М. Т. (2018). Гнездующий аппарат сеялки. *Экономика и социум*, (5), 223-227.
3. НЕГМАТУЛЛАЕВ, С., & КЕНЖАБОЕВ, Ш. МЕТРОЛОГИЯ, СТАНДАРТИЗАЦИЯ И ВЗАИМОЗАМЕНЯЕМОСТЬ. - fmmp.bntu.by
4. Мелибаев, М., & Нишонов, Ф. А. (2017). Определение площади контакта шины с почвой в зависимости от сцепной нагрузки и размера шин и внутреннего давления. *Научное знание современности*, (3), 227-234.
5. Нишонов, Ф. А., Мелибоев, М., & Кидиров, А. Р. (2017). Требования к эксплуатационным качествам шин. Science Time, (1), 287-291.
6. Нишонов, Ф. А., Мелибоев, М., & Кидиров, А. Р. (2017). Тягово-сцепные показатели машинно-тракторных агрегатов. Science Time, (1), 292-296.
7. Мелибаев, М., Нишонов, Ф. А., & Содиков, М. А. У. (2021). Показатели Надежности Пропашных Тракторных Шин. Universum: технические науки, (2-1 (83)).
8. Мелибаев, М., Нишонов, Ф. А., & Кидиров, А. Р. (2017). ГРУЗОПОДЪЁМНОСТЬ ПНЕВМАТИЧЕСКИХ ШИН. Научное знание современности, (4), 219-223.
9. Мелибаев, М., Кидиров, А. Р., Нишонов, Ф. А., & Хожиев, Б. Р. (2018). ОПРЕДЕЛЕНИЕ ГЛУБИНЫ КОЛЕИ И ДЕФОРМАЦИИ ШИНЫ В ЗАВИСИМОСТИ ОТ СЦЕПНОЙ НАГРУЗКИ, ВНУТРЕННЕГО ДАВЛЕНИЯ И РАЗМЕРОВ ШИН ВЕДУЩЕГО КОЛЕСА. Научное знание современности, (5), 61-66.
10. Нишонов, Ф. А., Мелибоев, М., Кидиров, А. Р., & Акбаров, А. Н. (2018). БУКСОВАНИЕ ВЕДУЩИХ КОЛЕС ПРОПАШНЫХ ТРЕХКОЛЕСНЫХ ТРАКТОРОВ. Научное знание современности, (4), 98-100.
11. Нишонов, Ф. А., Хожиев, Б. Р., & Қидиров, А. Р. (2018). ДОН МАХСУЛОТЛАРИНИ САҚЛАШ ВА ҚАЙТА ИШЛАШ ТЕХНОЛОГИЯСИ. Научное знание современности, (5), 67-70.
12. Хожиев, Б. Р., Нишонов, Ф. А., & Қидиров, А. Р. (2018). УГЛЕРОДЛИ ЛЕГИРЛАНГАН ПЎЛАТЛАР ҚУЙИШ ТЕХНОЛОГИЯСИ. Научное знание современности, (4), 101-102.
13. Mansurov, M. T., Nishonov, F. A., & Xojiev, B. R. (2021). Substantiate the Parameters of the Plug in the" Push-Pull" System. Design Engineering, 11085-11094.

14. Mansurov, M. T., Otahanov, B. S., Xojiyev, B. R., & Nishonov, F. A. (2021). Adaptive Peanut Harvester Stripper Design. International Journal of Innovative Analyses and Emerging Technology, 1(4), 140-146.
15. Мелибаев М., Нишонов Ф., Норбоева Д. Плавность хода трактора. Наманган муҳандислик технология институти //НМТИ. Наманган. – 2017.
16. Рустамов, Р. М., Отаханов, Б. С., Хожиев, Б. Р., & Нишанов, Ф. А. (2021). УСОВЕРШЕНСТВОВАННАЯ ТЕХНОЛОГИЯ УБОРКИ АРАХИСА. МЕХАНИКА ВА ТЕХНОЛОГИЯ ИЛМИЙ ЖУРНАЛИ, (3), 57-62
17. Мелибаев, М., Нишонов, Ф., Махмудов, А., & Йигиталиев, Ж. А. (2021). ПЛОЩАДЬ КОНТАКТА ШИНЫ С ПОЧВОЙ НЕГОРИЗОНТАЛЬНОМ ОПОРНОЙ ПОВЕРХНОСТЕЙ. Экономика и социум, (5-2), 100-104.
18. Mansurov, M. T., Nishonov, F. A., & Xojiev, B. R. (2021). Substantiate the Parameters of the Plug in the" Push-Pull" System. Design Engineering, 11085-11094.
19. Mansurov, M. T., Otahanov, B. S., Xojiyev, B. R., & Nishonov, F. A. (2021). Adaptive Peanut Harvester Stripper Design. International Journal of Innovative Analyses and Emerging Technology, 1(4), 140-146.
20. Мансуров, М. Т., Отаханов, Б. С., Хожиев, Б. Р., & Нишанов, Ф. А. (2021). УСОВЕРШЕНСТВОВАННАЯ ТЕХНОЛОГИЯ УБОРКИ АРАХИСА. МЕХАНИКА ВА ТЕХНОЛОГИЯ ИЛМИЙ ЖУРНАЛИ, (3), 62-68
21. Мансуров Мухторжон Тохиржонович, Хожиев Бахромхон Рахматуллаевич, Нишонов Фарходхон Ахматханович, & Кидиров Адхам Рустамович (2022). МАШИНА ДЛЯ УБОРКИ АРАХИСА. Вестник Науки и Творчества, (3 (75)), 11-14.
22. Toxirjonovich, M. M., Akhmatkhanovich, N. F., & Rakhmatullaevich, X. B. (2022, May). COMBINATION MACHINE FOR HARVESTING NUTS. In Conference Zone (pp. 19-21).
23. Отаханов, Б. С., Пайзиев, Г. К., & Хожиев, Б. Р. (2014). Варианты воздействия рабочего органа ротационной машины на почвенные глыбы и комки. Научная жизнь, (2), 75-78.
24. Rustamov, R., Xalimov, S., Otaxanov, B. S., Nishonov, F., & Xojiev, B. (2020). International scientific and scientific-technical conference" Collection of scientific works" on improving the machine for harvesting walnuts.
25. Худайбердиев, А. А., & Хожиев, Б. Р. (2017). Энергосберегающая технология проведения процессов нагревания нефтегазоконденсатного сырья и конденсации углеводородных паров. Научное знание современности, (4), 395-400.
26. Киргизов, Х. Т., Саидмахамадов, Н. М., & Хожиев, Б. Р. (2014). Исследование движения частиц почвы по рабочей поверхности сферического диска. Вестник развития науки и образования, (4), 14-19.
27. Mansurov, M. T., Otahanov, B. S., & Xojiyev, B. R. (2021). Advanced Peanut Harvesting Technology. International Journal of Innovative Analyses and Emerging Technology, 1(4), 114-118.
28. Отаханов, Б. С., Пайзиев, Г. К., Хожиев, Б. Р., Миркина, Е. Н., & Левченко, С. А. Технические науки. Интерактивная наука, 50-54
29. Халимов, Ш. А., Хожиев, Б. Р., & Абдурахимова, Г. Ш. (2017). ИССЛЕДОВАНИЯ ФИЗИКО-МЕХАНИЧЕСКИХ СВОЙСТВ АРМИРОВАННЫХ КОМПОЗЦИОННЫХ ПОЛИМЕРНЫХ МАТЕРИАЛОВ ПРИ РАЗНЫХ ТЕМПЕРАТУРАХ. Научное знание современности, (4), 373-378.

30. Toxirjonovich, M. M., & Rakhmatullaevich, X. B. (2022, May). THE RESULTS OF A STUDY ON THE SELECTION OF THE WORKING PART THAT SEPARATES THE NUT PODS FROM THE HUSK. In Conference Zone (pp. 14-18).