10. *PartoMr. VZ* Mechanicsand upruhoplastycheskohabout razrushenyl / *VZ. Parton, EM Morozov*. - M .: Nauka, 1985. - 504 p.
11. *Ryabetsin GA* Methodology for determining K sostavlyayuschyh traction Resistance kultyvatornыx laSection / *GA. Riabtsev* // Mehanyzatsyl and эlektryfykatsyl sotsyalystycheskoho agricultural sector. - 1967. - № 6.- S. 55-56.

In the work vыyasnen fyzycheskyy Mechanism occurrence resonances in the system "vybratsyonnaya razrыhlytelnaya paw - Soil" and conducted calculation parameters ratsyonalnыh interaction with bodies pochvoy workers with uchetom suschestvennoy nelyneynosty lapы soil and How-elastic vyazko- plastycheskoy environment.

Resonance, Rыhlenye, Vibrate, paw cultivator, soil.

The paper clarified the physical mechanism of resonances in system "oscillation tillage tool - soil" and conducted calculation of rational parameters of interaction of tillage tools with soil, taking into account material nonlinearity tools and soil as elastic-visco-plastic medium.

Resonance, loosening, vibration, cultivator share, soil.

UDC 631,794

KLAONOMIRNOSTI mechanochemical processes in abrasive wear MACHINES

M.And. Denisenko, Ph.D.

This article describes a comprehensive study of abrasive processes of machine parts and working bodies, assessment deformation mechanics and chemical interaction with the environment.

Abrasive wear, working parts, friction surfaces, vomer plow.

Resolutionska problem. PEid term "abrasions" mean the destruction of friction surfaces under the influence of particulate matter that is in the area of friction. Thus, this type of attribute depreciation vyzyvayetsya particles that are separated by friction. Abrasive wear for a long time tied exclusively Trailer influence of abrasive particles that seemed obvious, and for many decades did not suffer any doubts. Studies have shown that abrasive particles contacting

of the surface layer, it creates a wide range of contact stress distribution pattern and whose upper limit numerical values depend on the material properties that wear out, and the hardness, shape, particle size and the terms of their impact on the workpiece surface.

DetailNo studies MM Khrushchev and MI Babicheva summed up in [1], devoted mainly to the investigation of abrasive wear rigidly fixed abrasive (abrasive wear was carried out on the skin). Indeed, in their experiments, the authors observed the formation of chips. But this phenomenon is not comprehensive enough character.

For existing concepts, based abrasive interaction at work and working parts of the machine are mechanical processes of damage and destruction of the basic material friction surfaces. This
atled to a one-sided approach in solving practical problems. Inevitable mechanochemical processes that determine the processes
tertI in abrasive wear most parts of machines and workers, virtually unknown.

AnaLease Latestnih dossurvey findings.

Toslidzhennya beginsDo from comprehensive study of the state of the friction surfaces and surface layers of machine parts and their operating conditions, allowing to identify the factors that determine the flow mechanochemical form of abrasive wear and to establish the causes of yakoho- some other pathological process fracture surface, if such is the case. [2,3]. All study surface layers of metals was carried out using metaloznavchoho analysis methods and experimental physics. Analysis of the processes of wear of machine parts performed in terms of structure-energy theory. Separation of abrasive wear possible to create a test unit for playback not formal external conditions of specific units of friction and wear processes and damage observed when using real machine parts. Tests were carried out initially in the laboratory on the equipment of PJSC "NDIfermmash." As wearing protection using air-abrasive blast stream post of its own making. Abrasive material is iron shot, GOST 11964-81 peas with particle sizes from 40 to 1500 microns, different shapes. The hardness of 58-64 HRC. Angle
impact flow to surface wear 75 °. The distance from the nozzle to the surface wear 50-60 mm. Nozzle diameter 8 mm spot
Abrasivetion flow to the working distance of 20 mm. Air pressure in the line of 50-60 MPa. The measurements were carried out after depreciation value
cost 100, 200, 300 grams of abrasive test stopped

Sectionislya excavation to the base or cover plates soldered mountings. Durability material machine parts made of steel 65G hardening of microwave adopted by 1.0. The highest wear resistance (150 times compared with steel 65G) has a hard alloy VK-6; then NTN-30 (120 times) TC-2 (30 times); steel R6M5 (6 times); relit (surfacing) 4.3 times; steel 65G (laser hardening) of 1.2 times.

Samples powder nanocomposites studied methods: scanning (scanning) electron microscopy SEM (SEM); e Auger spectroscopy, ultra-high vacuum EOS-Auger
brand microprobe JEOL JAMP-10S. The concentration of elements evaluated by the intensity of characteristic Auger lines and corresponding coefficients of relative sensitivity of the known [4] formula:

$$C_i = \frac{I_i/g_i}{\sum_{k=1}^{n} I_k/g_k}, \quad (1)$$

where C_i, I_i tandg_i - Concentration (in at.%), The intensity of the whole Auger line
abcharacteristic of its parts and the coefficient of relative sensitivity *i*- Th thshout, respectively; *n*- The total number of elements, whose concentration is calculated.

Metand dperssurvey findings - toanddoctrine furandnohimichnoyi Formsand

Abrasivetion wear and developing reasonable steps to improve durability of working organs of agricultural machines operated in abrasive environments.

Rezultaty research. Pizannya soil and plants is a common manufacturing operations in agriculture
CompLexie: plowing, cultivation, harrowing, mowing grass,
ondribnennya silage harvesting of grain and industrial crops and other transactions is not less than 70% of the total volume of mechanized operations. The interaction with soil working bodies tillage and sowing machines undergo intensive abrasive wear. At the same time, the state of the blade body working agricultural machines depend primarily indicators such works as the degree of weed cutting average depth of cultivation, the degree of grinding resistance paws course (blade) in depth, the resistance of the unit. Increased wear resistance of agricultural machinery of domestic production is an urgent problem for producers and consumers, as life of many elements below foreign analogues 2-3.

Beforeand modeling efforts were combined with the establishment of dependency rate of wear of known mechanical characteristics: hardness, tensile strength gap limits fatigue, normal elasticity module. The most successful this approach is used to model the abrasive wear. In the

created models distinguish abrasive wear of sliding parts in monolithic abrasive loose abrasive in the free state, with a solid kick or free abrasive, hydro and gaseous wear and different interaction contacting parts abrasive particles. Complexity and not stationary process, its random nature did not allow a general theory abrasive wear. Type of wear depends on the nature of interaction between the abrasive particles from the surface layer material. In detail agricultural machines observed abrasive wear of three types, each of which has two subspecies (Table.). Table machine parts grouped on the basis of common types of wear that allows us to study the wear resistance of materials regardless of size, shape and functional purpose components [5]. Research abrasive particles form structure, geometry and element composition of different groups and working parts of the machine showed that the leading type of wear is a form of mechanochemical abrasive wear.

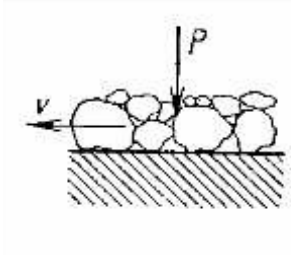
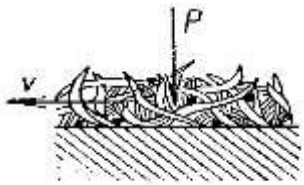
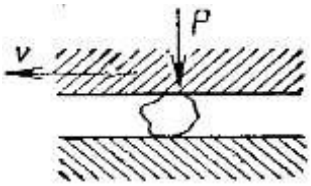
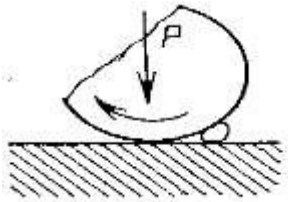
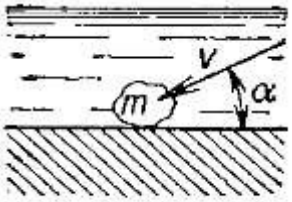
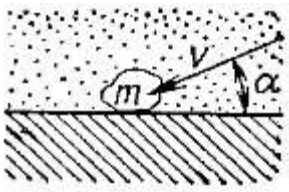
In all cases there is activation of the surface layers of details, instantaneous interaction with active elements of the environment, oxidation and formation of new phase-secondary institutions and their following destruction.

EID-identification element of surface metal volumes, mainly oxygen, revealed that in the technical operation on friction all studied components operating in abrasive environments created a new layer transformed secondary structure mechanochemical origin. Our studies allow us to offer
devicdivision ways to improve the abrasive wear resistance management parameters mechanical properties of machine parts and chemical activity workspaces.

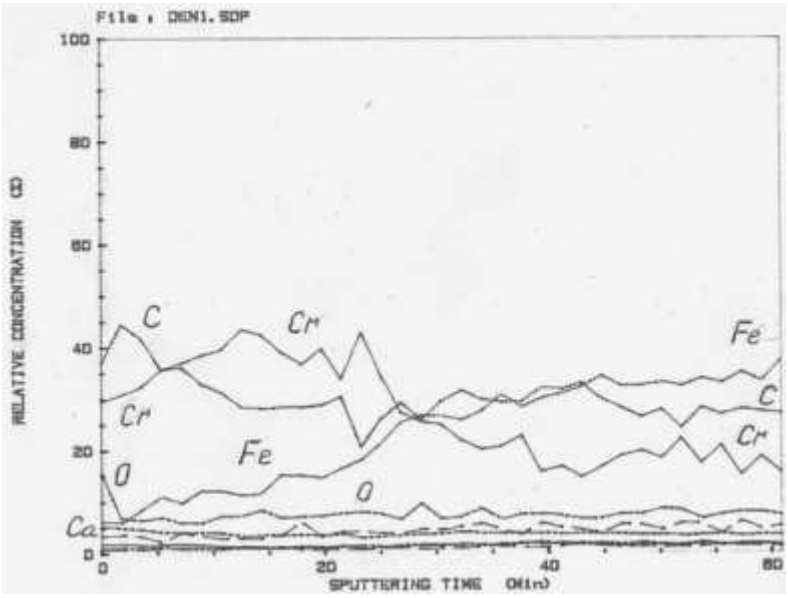
Based on Auger spectral analysis of surface
tertmachine parts I found that the maximum oxygen is not on the surface friction, but at some distance from it, usually at a depth of 0.1 m and is 15 ... 28% [9].

Prand friction surfaces identified two areas of stressed with a different strain of: area elastic plastic deformation and elastic deformation area. According to [6,7] depth of the first section
not exceeding hundred angstroms, while a section of elastic deformation can be equal to several hundred micrometers. The sharp strengthening of physical and chemical activity of the surface layer is the result
occur in the material is not high equilibrium concentration imperfections, vacancies and atoms dislocation density is
greatoppression
saturation [8].

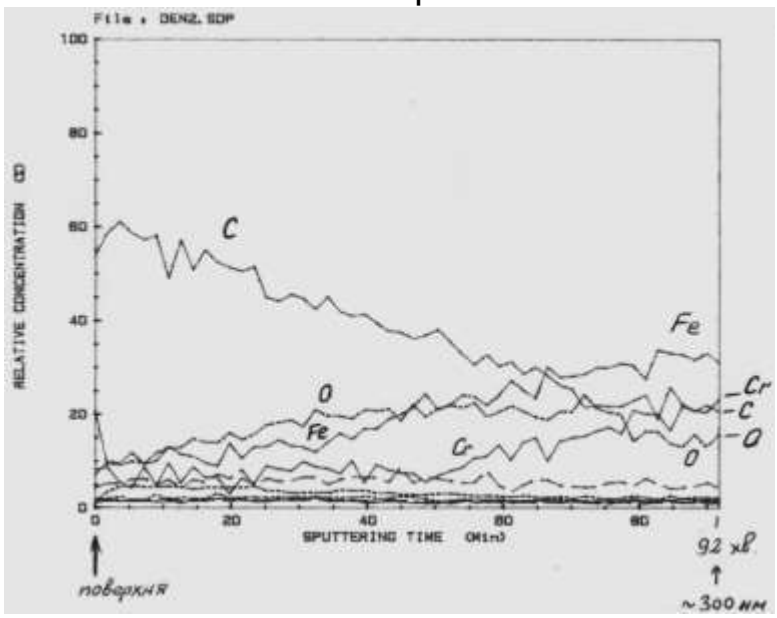
Main viewandandbrazyvnoho fromnoshuvannya details withilskohospodarskyh machines [5].

CHema contact Abrasivex particles from the surfaces of parts that wear out	Youd & Conditions wear		Examples of parts and working bodies that wear
 I	The mass of abrasive particles	When you move a mass of dirt and fertilizer	Plowing blade, cultivators legs, shelf strips, field boards, screws downloaders fertilizers
 II		When you move in plant mass containing abrasive particles	ButJi forage harvesters, headers segments, screws cleaning machines, parts sylosoprovodiv
 III	Contact-abrasive	CBaked parts sliding friction of abrasive particles in contact	Bidkryti joints, bearings, sprockets and zub'ya link chains
 IV		Same friction bearings	Shengstubble open gear drives harrows
 V	Hydro and hazoabrazyvne	Solid particles in a fluid stream	CoPla and sprinkler deflectors machines, sprayers spray caps, wheels centrifugal pumps
 VI		Same in the air stream	Luopatky fans, details of pnevmotransportuvannya, hammer crushers

Prformation of secondary structures of oxygen origin on friction materials studied, illustrated by the presence of oxygen in the surface layers obtained by renheno and spectral analysis. Measures the intensity of characteristic spectral lines for each element and using relative sensitivity coefficients of elements in the Auger electrons, counting the relative atomic concentration. Typical concentration profiles of elements shown in Fig. 1, Fig. 2. They describe the state of the surface layer coated PG-C27 and composite material KHZH-70.

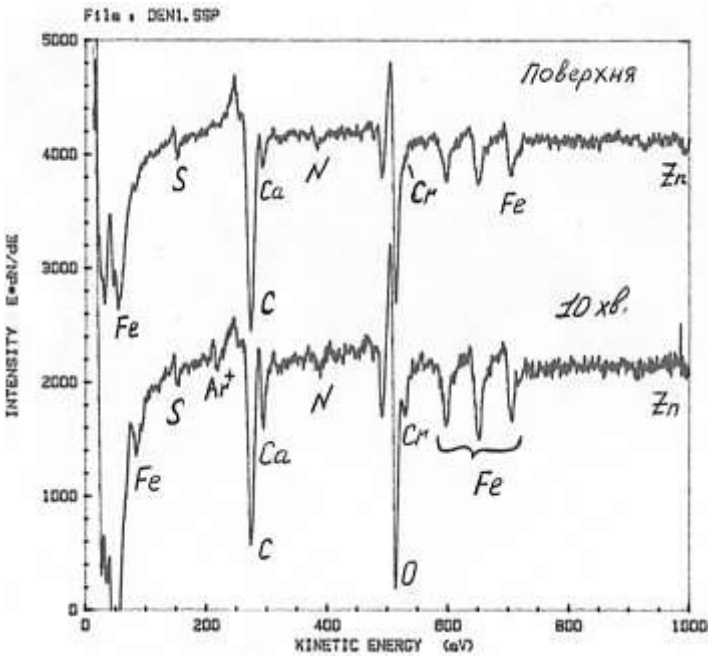


Ric. 1. Concentration profile elements in the surface layer thickness of 300 nm = 0.3 micron composite material KHZH-70.



Ric. 2. Concentration profile elements in the surface layer thickness of 200 nm = 0.2 micron coating PG-C27.

The amount of oxygen in the surface layers and deep layers are directly dependent on the mechanical properties of materials, and one of the main parameters of the friction-pressure, which measures the intensity of plastic deformation in abrasive wear. Fig. 3, Fig. 4 shows the Auger spectra of the material.

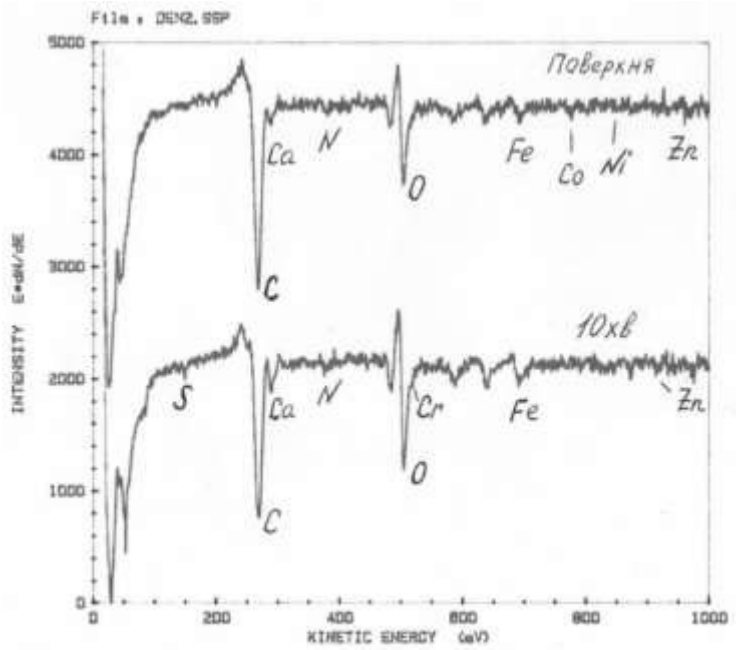


Ric. 3. Auger spectra of surface friction coated PG-C27 thickness of 200 nm = 0.2 micron coating PG-C27.

On the surface a carbon film (Fig.1.), Beneath a film of iron oxides and chromium. Oxygen is not a lot and formed secondary structure of type I with a significant amount of carbon. On the surface a film of chromium carbide. Carbon to oxygen ratio is an element of a reducing agent that restores metal ties, prevents oxidation process of metal forming processes and secondary structures of type II.

In this regard, these secondary structures can be attributed to the sun I type. Concentration gradient in the depth of oxygen and carbon observe enriched in the volume of steel element no oxygen accumulates from the environment. Chemical composition of secondary structure characterized by a high oxygen content, the amount of which in the surface layers of the working parts is 0,041 ... 16.8%. Thin film abrasive friction zone face

complex process of destruction and recovery that are not consistent with traditional principles of thermodynamics equilibrium systems. Dynamic equilibrium in the formation and destruction of tapes secondary structure determines the characteristics of wear parts conjugations and working bodies.



Rice. 4. The spectra of surface friction composite material KHZH-70.

Plivky secondary structures (CS) shielding the basic material of direct contact and destruction; intensity with minimal wear. [9]. When set to abrasion influence specific material flows wear a process, but in different materials wear processes can be different. Acad. PA Rehbinder considered abrasive wear of materials, surface dispersion as a result of repeated plastic deformation that leads to hardening and fatigue micro material [10]. IV KRAGELSKY wear proposed a quantitative theory of solids, taking into account the nature of the fatigue fracture surface, which is on the main ideas can be used for abrasive wear [11].

Conclusions

Toadditionally factor that significantly affects the processes of friction and wear, abrasive presence is inevitably present in places conjugations contact details and working of agricultural machines.

MeHanoi-chemical form of abrasive wear and damage of the most common types of demolition work surfaces
tillage, sowing, dibbling and forage machines.

References

1. *Xruschov MM*. Abrazyvnoe yznashyvanye / *M.M. Khrushchev*,*M.A. Babicheva*. - M .: Nauka, 1970. - 232 p.

2. *Poverhnostnaya* prochnost materials at trenyy / [*Kostetskyy BI, Nosovskyy IG, AK Karaulov* et al.]; Under Society. ed. *Kostetskoho BI* - K .: Technique, 1976. - 296 p.
3. *Kostetskyy B.Y*. Mechanical-Chemical Processes at extremely trenyy / *Kostetskyy BI, Nathanson M.Э., Bershadsky L.Y*. - Science, 1972. - 170 p.
4. *Analyz* Auger and surface methods renthenovskoy fotoэlektronnoy spektroskopyy: Per. with the English. / Ed *D. Briggs, MP Syha*. - M .: Mir, 1987. - 600 p.
5. *Tenenbaum MM* Resistance to abrasive yznashyvanyyu / *M.M. Tenenbaum.* - M .: Mashinostroenie, 1976. - 271 p.
6. *Nadezhnost* Durability and cars / [*Kostetskyy BI, Bershadsky LI, AK Karaulov*]. - K .: Technique, 1975. - 399 p.
7. *Kostetskyy B.* The process shvatыvanyya metals and Criteria otsenki ego intensity / *B. Kostetskyy, I. Nosovskyy*. - K .: Technique, 1972. - Problems and trenyya yznashyvanyya; no. 2. - P. 131.
8. *Kostetskyy BI* Structural and Control Fundamentals эnerhetycheskye trenyem and yznosom in machines / *B.Y. Kostetskyy.* - K.: Society "Knowledge", 1990. - 31 p.
9. *Fromazymko O.*. Zakonomernosty mehanohymycheskyh processes in steel abrasive yznashyvanyy: Author. Thesis. for obtaining sciences. degree candidate. Sc. sciences spets.05.02.04 "Trenye and yznos in cars" /*OV Zazymko*. - K .: 1988. - 19 p.
10. *Rebynder PA* VlAmong yyanye aktyvnыh lubricants on deformation sopryazhennыh surfaces trenyya / *P.A. Rebinder*. - Minsk: Science and Technology, 1971. - P. 27.
11. *Krahelskyy Y.V*. Trenye and yznos in machines / *IV Krahelskyy.* - M .: Mashinostroenie, 1968. - 480 p.

In this article describes INTEGRATED Study abrazyvnыh processes in detail machines and working bodies, evaluation of deformation mechanics and chemistry interaction with External environment.

Abrazyvnoe yznashyvanye, Rabochie orhanы, Surface trenyya, Lemekh plow.

The paper describes complex approaches of friction processes of machine tooling and its elements. This problem can be achieved on way of devising dynamical models which well completely express friction and abrasive of wear processes models considered will allow to extend friction unit capacity and to improve their reliability.

Abrasive wear, working organs cultivation machine, blade share, surface hardening.