RESEARCH OF INFLUENCE OF LUBRICANTS ON WORKING AND OPERATING PROPERTIES OF CORROSION-STEEL STEELS

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Corrosion resistant steels are important structural materials. They find application in various fields of engineering: energy, industry, construction, medicine, etc. Lubricating and cooling liquids (LCL). Their main function is to reduce friction. Therefore, they can be used: 1) as process fluids intended to improve machining; 2) as process fluids designed to improve lubrication in tributary connections [1,2].

The effect of LCL friendly lubricating and cooling liquids (LCL) based on vegetable oils was investigated. It was found that LCL on the basis of sunflower (LCLs) and rapeseed oil (LCLr), compared with mineralized water. Petroleum-based (LCLn) was also examined for comparison.

Electrochemical studies of polished specimens in LCL and mineralized water were performed to determine the ability of the LCL to protect the surface of the machined parts from corrosion.

The character of curves for steel 12Kh18AG18Sh indicates the anode nature of the electrode processes. The time dependences of the electrode potentials for 12Kh18AG18Sh steel obtained after machining (cutting the sample surface with a cutter on a lathe) in LCL and water showed different electrochemical behavior. It is established that during stabilization of stationary potentials of steels with machined surfaces, repackivation of 12Kh18AG18Sh occurs (increase of potential values from -330… -340 mV to 40… 60 mV).

The results of the surface roughness evaluation of the 12X18AG18S steel samples after grinding in the above media obtained after processing the profilograms showed that the surface quality of the steel samples during grinding in LCLs improved by almost 1.5… 2.0 times compared to treatment in LCLn and without treatment fluid 12 times, which shows the prospect of using vegetable oil for LCL.

It has been shown that chips and corrosion products on its surface can be unique indicators that allow to analyze the performance of machining processes of a workpiece and material properties. It is reported that when increasing the machining speed to 500 rpm, chip breakage occurs without the use of chip breakers. This avoids the formation of long chips that can damage the work surface.

The use of LCL as a lubricant in tribo (steel 45 - high-nitrogen steel) in the conditions of rolling friction allowed us to establish that the intensity of wear (P = 500 N) in comparison with industrial oil I12A when using LCLs is lower by 45%, and at LCLr 35%.

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ABSTRACT BOOK

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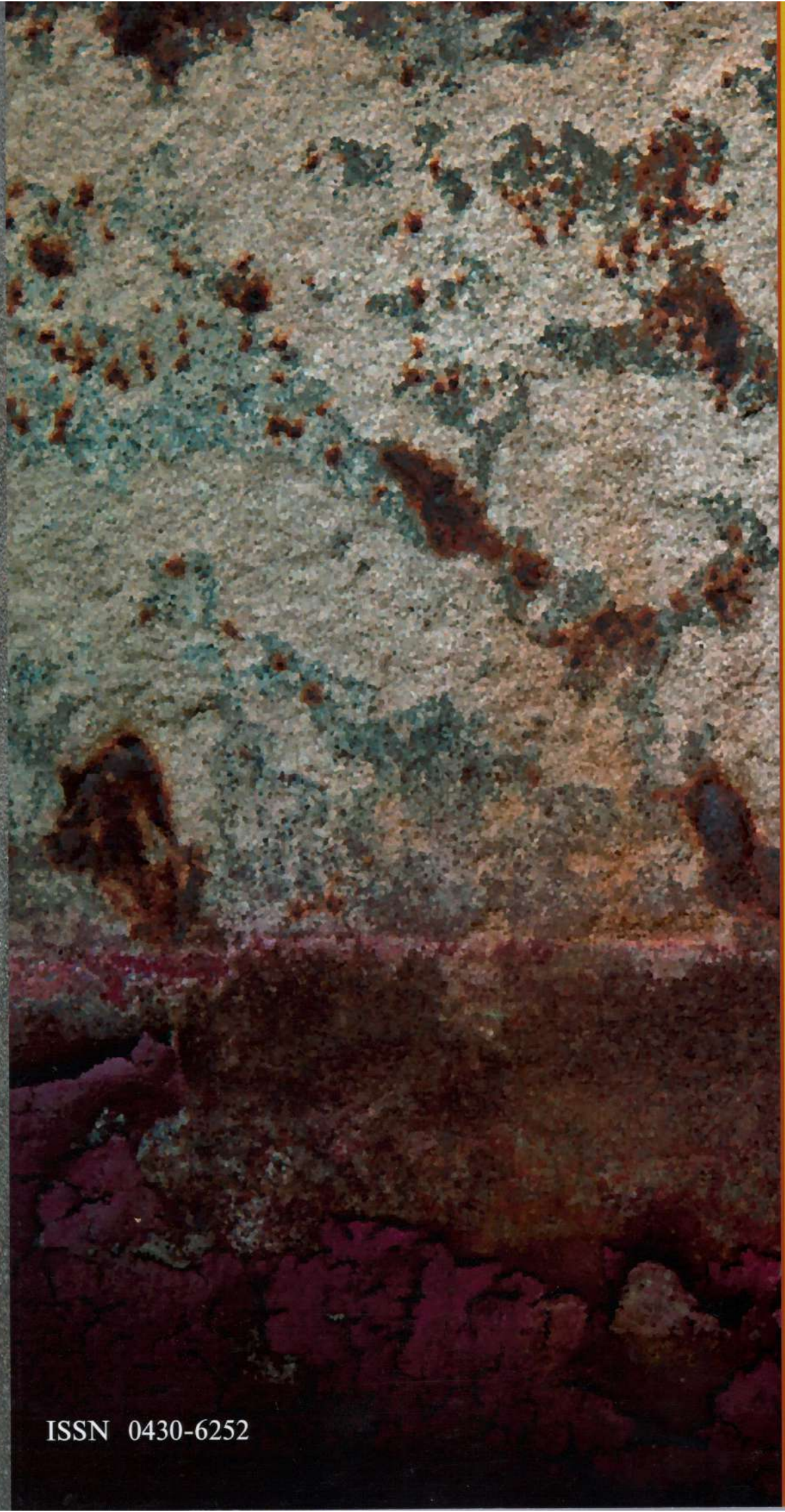

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XV International Conference "Problems of Corrosion and Corrosion Protection of Materials" (Corrosion-2020) was held at Lviv Palace of Arts on October 15-16, 2020. This Book of Abstract contains the results of studies are devoted to fundamentals of corrosion and corrosion assisted mechanical fracture; hydrogen and gas corrosion; new corrosion resistant materials; thermal spray, electroplated and other coatings; inhibitor, biocidal and electrochemical protection; testing methods and corrosion control; corrosion protection of oil and gas industry and chemical equipment.

In the authors edition.

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- fundamentals of corrosion and corrosion assisted mechanical fracture;
- hydrogen and gas corrosion;
- new corrosion resistant materials and coatings;
- inhibitor and biocidal protection;
- electrochemical protection;
- testing methods and corrosion control;
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The Department of Corrosion and Corrosion Protection conducts the following research and testing of materials in corrosion environments:

- **Corrosion resistance testing of materials and coatings in various aggressive environments using standardized methods** (potentiodynamic polarization method, gravimetry, electrochemical impedance spectroscopy, climate chamber, etc.).
- **Synthesis of metal corrosion inhibitors and testing of their anti-corrosion effectiveness, development of inhibiting pigments and protective metallic and organic coatings.**
- **Investigation of physical and mechanical properties of paint coatings on metals by standard methods:** adhesion, flexural strength, impact strength, etc.
- **Corrosion-mechanical studies of materials in aggressive environments** (corrosion-fatigue tests of metals and alloys, determination of resistance of steels to stress corrosion cracking in different environments).
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- **Preparation of samples and specimens for metallographic, X-ray structural, X-ray fluorescent, and other physicochemical methods of analysis** using a planetary ball mill Retsch PM 100 (Germany), installation for spraying samples of magnetron type JFC-1600 (JEOL, Japan), grinding equipment LABOPOL-5 (Denmark).
- **Investigation of the surface of materials and determination of their chemical composition** using optical microscopy and scanning electron microscope Zeiss EVO 40-XVP (Germany) and energy dispersion spectrometer INCA Energy 350 (Oxford, England).
- **Quantitative analysis of the characteristics of roughness and waviness of the surfaces of materials using a profilograph-profilometer "Calibr S-265"**.
- **Determination of hardness and microhardness of materials and their structural and phase components.**
- **Determination of hydrogen concentration in metals by vacuum extraction method.**
- **Synthesis of hydrogen sulfide and production of model hydrogen sulfide media** for research and testing of metals and alloys using a laboratory generator of high pressure hydrogen sulfide (1-15 atm).

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