



UKRAINE TEAM



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INCREASE CORROSION RESISTANCE OF STEEL PRODUCTS WITH DIFFUSION COATING

INTRODUCTION

Protection of metals against corrosion provides long-term functioning of machine parts and structures made of carbon steels. To ensure reliability and increase the service life, it is necessary to search for effective ways to increase their corrosion resistance

PURPOSE

Improvement of operational properties of steel 45 (microhardness, corrosion resistance) by applying chromium titanium alated coatings

TASKS

- application of chromium titanium alated coatings on parts made of steel 45;
- determination of microhardness of the obtained coatings;
- study of corrosion resistance of diffusion coatings in water aggressive environments

PROGRESS OF WORK



Mixture [25% Cr, 15% Ti + 10% Al + 47% Al₂O₃ + 3% NH₄Cl]



Container with chemical-thermal treatment



T=1050°C, time-4hours



The appearance of coated samples

HYPOTHESES

The formation of diffusion coatings on the surface of steels based on elements with high chemical activity (chromium, titanium, aluminum) and forming protective continuous oxide films is promising, which will lead to an increase in corrosion resistance



Corrosion tests in industrial water



Corrosion tests in sulfuric acid solution

RESULTS



Without coatings With coatings

6 h



48 h



Protective properties of diffusion coatings applied to steel 45

Aggressive environment	Indicators			
Tap water	0,18	0,033	5,45	82,65
10% aqueous solution CH ₃ COOH	5,85	0,3	19,5	94,78
0,5% aqueous solution H ₂ SO ₄	19,15	2,54	7,67	86,93
5% aqueous solution H ₂ SO ₄	212,78	3,19	66,78	98,5
10% aqueous solution NHO ₃	134,17	2,51	53,45	98,13

CONCLUSIONS

The coatings studied in the work simultaneously contribute to the increase of microhardness and corrosion resistance of steel 45, which will make it possible to use them for products operating under conditions of simultaneous action of specific loads and aggressive environments