



EFFECT OF COATING THICKNESS ON MECHANICAL PROPERTIES OF ADC12 ALLOY

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Abstract: This thesis examines the effect of the thickness of the coating on the mechanical properties of the surface of the reducer housing made of ADC12 aluminum alloy . The coating thickness is an important technological parameter that determines the hardness, strength, wear resistance and adhesion properties of the surface between the coating and the base material. The study proposes to prepare samples with ADC12 coatings of different thicknesses and compare their mechanical properties. By determining the relationship between the coating thickness, surface hardness, microstructure and wear indicators , it is shown that it is possible to determine the optimal coating parameters for the reducer housing.

Key words: ADC12, aluminum alloy, coating thickness, reducer housing, hardness, strength, wear, adhesion, microstructure.

Introduction

Machine and of mechanisms Structural elements are exposed to various mechanical and thermal loads during operation. In particular, the gearbox housing is subjected to vibrations and mechanical loads resulting from the operation of gears and bearings . Therefore, it is important that the housing surface has sufficient mechanical strength and wear resistance .

properties of the surface layer of the part while maintaining its basic structural properties . When ADC12 aluminum alloy is used as a surface coating , the coating thickness is one of the main parameters determining its final properties.

Research methodology

Research For this purpose , samples coated with ADC12 alloy at different thicknesses are prepared. For example, experimental groups can be formed with coating thicknesses of **0.5; 1.0; 1.5 and 2.0 mm** . The final values are determined according to the coating technology used and the experimental conditions.

Every one in the sample following indicators are determined:

No.	Indicator	Detection method
1	Coating thickness	Metallographic section
2	Surface hardness	Vickers/Rockwell
3	Adhesion strength	Special adhesion test
4	Eating speed	Tribological testing
5	Microstructure	Optical microscope/SEM
6	Surface roughness	Profilometer

Coating thickness and The experimental results are presented graphically to determine the relationship between hardness and wear . The change in wear intensity with increasing coating thickness is also evaluated.





Coating thickness mechanic effect on properties

ADC12 coating thickness The mechanical properties of the surface may change with increasing thickness. However, increasing the thickness of the coating indefinitely does not always have a positive effect. Too thin a layer may not sufficiently change the properties of the base material, while too thick a layer increases the likelihood of internal stresses, porosity, or defects at the coating-base interface.

That's why When determining the optimal thickness for a coating, it is necessary to simultaneously take into account the indicators of **hardness, adhesion, wear, and microstructural condition**.

Research the results following can be analyzed through dependencies:

$$[H=f(h)]$$

$$[W=f(h)]$$

$$[F=f(h)]$$

here:

h — ADC12 coating thickness ; **H** — surface hardness ; **W** — wear quantity ;

F — coating – base adhesion strength between the materials .

Expected results

Experience as a result coating It is possible to determine the optimal relationship between the thickness and the surface hardness and wear resistance. Increasing the coating thickness up to a certain limit can improve the mechanical properties of the surface, after which the efficiency may decrease due to the increase in internal stresses and defects in the coating.

Also, microstructural analysis The effect of coating thickness on dendrite structure, porosity, and structural changes at the coating-base interface is evaluated.

Conclusion

ADC12 alloy coating The thickness is an important technological parameter that shapes the mechanical and tribological properties of the surface of the reducer housing. By optimizing the thickness of the coating, it is possible to increase the surface hardness and wear resistance, as well as ensure a strong bond between the coating and the base material.

Various Comprehensive testing of ADC12 coatings with a thickness of 100 mm allows us to determine the relationship between **coating thickness, hardness, wear, and adhesion**. **This approach provides a scientific** basis for determining the optimal coating thickness for the gearbox housing. to choose service does.

Used literature

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