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INFORMATION ON NOVEL CONTRIBUTIONS OF THE DOCTORAL DISSERTATION

Dissertation Title: *"Improving the Wear Resistance of High-Load Screw Presses by Integrated Design and HVOF Coating Solutions"*

Major: Mechanical Engineering Major code: 9520103

Doctoral Candidate: Nguyen Hong Tien Cohort: 07

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Institution: Hanoi University of Industry

NOVEL CONTRIBUTIONS OF THE DOCTORAL DISSERTATION

1. Scientific Contributions

This dissertation proposes an integrated research approach combining geometric design, numerical simulation, experimental validation, and surface engineering technologies to investigate and improve the wear resistance of high-load screw presses. This systematic approach represents a novel contribution compared with previous studies, which often addressed these aspects separately.

The dissertation establishes a theoretical and numerical framework to analyze load distribution, contact pressure, and wear tendency of high-load screw presses using the Discrete Element Method (DEM). The relationship between screw geometric parameters and localized wear mechanisms is clarified, providing a scientific basis for design optimization.

A significant novel contribution of this study is the identification and proposal of an optimized screw geometry that redistributes contact loads, reduces peak stresses, and mitigates localized wear. The effectiveness of this optimized design is verified through both numerical simulations and experimental investigations.

Furthermore, the dissertation demonstrates the effectiveness of High-Velocity Oxygen Fuel (HVOF) coating technology in enhancing the wear resistance of high-load screw presses. Appropriate coating materials and optimized HVOF process parameters for C45 steel substrates are proposed and experimentally validated, showing substantial improvements in surface hardness and wear resistance.

Chú ý:

- Thông tin về những đóng góp mới của luận án chỉ tử 1-2 trang A4

- Thông tin phải có 2 bản Tiếng Việt và Tiếng Anh

2. Practical and Industrial Contributions

The dissertation proposes a comprehensive solution to improve the wear resistance and service life of high-load screw presses, integrating optimized geometric design and HVOF surface coating. This solution is technically feasible and suitable for industrial application under domestic manufacturing conditions.

The research results are validated through practical operation tests in real industrial environments, confirming the effectiveness of the proposed solution in reducing wear and enhancing operational stability of screw presses.

In addition, the models, methodologies, and results presented in this dissertation can serve as valuable references for the design, optimization, and surface treatment of other high-load mechanical components, contributing to improved domestic manufacturing capabilities and reduced reliance on imported equipment.

3. Statement of Novelty

The results and contributions presented in this dissertation are original and novel, developed and verified systematically within the scope of this research. They do not overlap with previously published studies and demonstrate clear scientific significance and practical value.

Chú ý:

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