

INFORMATION ON DOCTORAL DISSERTATION

Full name of Doctoral candidate: **Tran Van Dua**

Dissertation name: *“Studying the fabrication technology of the chromium nitride (CrN) hard coating for prolonged lifespan of cold molds ”*

Specialty: Mechanical Engineering

Training sector code: 62.52.01.03

Full name of the scientific supervisor:

Assoc.Prof./Dr. Dao Duy Trung

Assoc.Prof./Dr. Dao Pham Duc Cuong

Training institutions: National Research Institute of Mechanical Engineering – Ministry of Industry and Trade

NEW CONCLUSIONS OF THE DISSERTATION

1. Regarding scientific significance

Systematizing the fundamental issues of the fabrication technology of the hard coating on surface of items and tools; proposing the fabrication methods of the CrN coating on SKD11 steel surface to apply for cold mold; evaluating chemical components, structure and properties of the dural coating; also recommending experimental model to study the effects of technological parameters of the coating process to the adhesion of the coating to the substrate.

By experiments on laboratory model, proposing and suggesting the use of measurement equipment, advanced specialized software; clarifying the law of influence of some technological parameters of the pulsed DC sputtering method to the adhesion of the CrN coating to SKD11 steel substrate; evaluating properties of abrasion and friction of the CrN coating.

2. Regarding practical significance

A set of the three technological parameters: frequency pulses, the nitrogen gas flow and temperature of coating sample for applying for cold mold is set. The research results can be applied to create the CrN hard coating on the surface of certain work cold stamping tools for prolonged lifespan and improved quality of cold stamping tools. It is possible to further study the practical application of the

hard coating by the pulsed DC sputtering method in practice for the surface of items and instruments.

The research results of the dissertation can also be used as a reference for teaching and research, as a basis for further studies for the purpose of an effective application of new technologies in processing metal surface in the conditions of Vietnam.

3. New contributions of the dissertation

Identifying the reasonable technological parameters to create the CrN hard coating with good adhesion on the SKD11 steel substrate; Evaluating the properties of friction and abrasion of the CrN coating; Applying for prolonged lifespan of cold mold.

From the results of theoretical and empirical research on creating the CrN hard coating by the pulsed DC sputtering method on SKD11 steel substrate, applications for prolonged lifespan of cold molds, we can extend the application for higher life expectancy and quality of tools and machine parts. At the same time, as the basis for further studies of other hard coatings.

Hanoi, November 16th 2016

Supervisor group

Assoc.Prof./Dr. Dao Duy Trung

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Doctoral candidate

Tran Van Dua