# INFORMATION OF A DOCTOAL THESIS IN ENGINEERING

Name of PhD candidate: Le Van Thoai

Name of thesis:“RESEARCH EFFECTS OF SOME PARAMETERS OF SUBMERGED ARC WELDINGWITH ADDITIONAL METAL POWDER ON THE WELDING QUALITY”

Specialization: Mechanical Engineering

Code No: 62.52.01.03

Full name of the scientific supervisor:

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## SUMMARY OF NEW CONCLUSIONS IN THESIS

### 1. Scientific significance of thesis

Research results have scientific implications as follow:

- Present a relationship between welding parameters including $I_h$, $V_h$, Nwith welding properties in the form of mathematical functions which are the basis functions for constructing thesubmerged arc welding procedurewith additional metal powder.

- Indicate influence of the mainwelding parameters, rate of added metal powder to the welding quality such as the weld shape andsize, welding microstructure, welding mechanical properties and productivity of welding process.

- Provide a simple approach to determine the optimal domain of multiple simultaneous criteria of welding quality.

- Analysis of variance to determine the combination of the three parameters Ih, Vh, N to achieve the highest mechanical properties in the surveyed domain and quantify the impact of these parameters on the mechanical properties of welds.

- Use the least squares regression tool to establish the mathematical relationship between $I_h$, $V_h$, N with themechanicalcriteria of the weld.Thereby theirinfluencesare analyzed. This is a basis for making parameters of the welding process.

**2. Practical significance**

- Suggesta set of technological parameters including ($I_h$, $V_h$, N) forthe submerged arc welding with additional metal powder to weld carbon steel structure with the highest quality.

- Evaluate the tendency and the influence of the technological parameters on the welding mechanical properties as a basis for adjusting the welding parameters to satisfy the requirements.

**3. New contributions of the thesis**

- Synthesis of theoretical basis of the submerged arc welding technology with additional metal powder to study the application in manufacturing products in our country.

- Apply the submerged arc welding with additional metal powder to manufacture mechanical products.

- Compare the microstructures of the welding joints betweensubmerged arc welding with additional metal powder and conventional submerged arc welding to construct a basis for evaluating weld quality.

- Construct a regression function toexpressthe simultaneous influence of the parameters ($I_h$, $V_h$, N) on the objective function as the mechanical properties of the weld.

- Use the OEC overall rating to find the appropriate level of technological parameters that simultaneously meet multiple welding goals.

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**Supervisor group** **PhDcandidate**

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