THESIS INFORMATION

Thesis title: **EFFECTS OF WELDING PARAMETERS ON MECHANICAL PROPERTIES AND MICROSTRUCTURAL FEATURES OF ALUMINUM ALLOY PLATES JOINTS PRODUCED BY FRICTION STIR WELDING.**

Field: **Material processing technology**

Code number: **62 52 04 05**

PhD student: **Mai Dang Tuan**

Supervisors: **1. Dr. Luu Phuong Minh**
2. Prof. Hoang Trong Ba

University: **Ho Chi Minh City University of Technology, Viet Nam National University Ho Chi Minh City.**

1. The object of the thesis:

- Researching the theory of Friction stir welding (FSW) technology, the modeling theory of heat generation, the mechanical and thermal properties of materials, the plastic deformation theory. Therefore, the research methods include Theory, Simulation and Experiments were combined.
- Studying the effect of FSW parameters on welding process, optimizing these parameters to improve the weld quality, eliminate weld defects, increase productivity and applicability of this technology.

2. Contribution of the thesis:

- The thesis has analyzed the material models, the plastic elastic models and the comparision between the numerical model and the experimental evidence showing the compatibility and compatibility.
- A numerical simulation of the welding process has been carried out, the results have identified the technological process parameters. The experiments on aluminum plates 6061 with 3, 4, 5 mm thickness were conducted based on the range of these parameters. After that, by checking the quality of weld joints by nondestructive testing (X-ray), destructive Weld Testing (microscopic examination) and mechanical test (tensile strength), we have established the appropriate range of FSW parameters.

- Developing the experimental functions of welding variables like tool rotation, transverse speed, plunge depth of the tool shoulder.
- Selecting a thermo-mechanical model built on the basis of solving the heat transfer problem in the welding workpiece; then use the temperature zone results to calculate stress and deformation according to the Zener-Hollomon model of solid, plastic and viscous materials. The research results show that the selection of simulation software and experimental models used is accurate and highly effective.

Supervisors **PhD student**

Dr. Luu Phuong Minh Prof. Hoang Trong Ba Mai Dang Tuan