

## Numerical and Experimental Approach to Evaluate Forming Coil of Electromagnetic Forming Process

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**Abstract :** Electromagnetic forming process (EMF) is one of high-velocity forming processes using Lorentz force. Advantages of EMF are summarized as improvement of formability, reduction in wrinkling, non-contact forming. In this study, numerical simulations were conducted to determine the practical parameters for EMF process. A 2-D axis-symmetric electromagnetic model was considered based on the spiral type forming coil. In the numerical simulation, RLC circuit coupled with spiral coil was made to consider the design parameters such as system input current and electromagnetic force. In order to deform the sheet in the patten shape die, two types of spiral shape coil were considered to deform the pattern shape sheet. One is a spiral coil that has 6turns with dead zone at centre point. Another is a normal spiral coil without dead zone that has 8 turns. In the electric analysis, input current and magnetic force were compared and then plastic deformation was treated in the mechanical analysis for two coil cases. Deformation behaviour of dead zone coil case has good agreement with pattern shape die. As a result, deformation behaviour could be controlled by giving dead zone at centre of the coil in spiral shape coil case.

**Keywords :** electromagnetic forming, spiral coil, Lorentz force, manufacturing

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