MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: **1058** Type: **Poster Presentation**

Thu-Mo-Po4.01-03 [2]: Pulsed magnet design and fabrication for generating background magnetic field in pulse current driven forming

Thursday, 26 September 2019 08:45 (2 hours)

Pulse current driven forming (PCDF) is a forming method that directly loads a pulse current into two parallel placed workpieces, and the mutually exclusive electromagnetic force between them causes the workpieces to be deformed. Compared with electromagnetic forming (EMF), this method can improve the current density in a low-conductivity workpiece. However, the magnetic field is low due to the lack of a forming coil, which causes the formability of the workpiece poor. In order to solve this problem, a pulsed magnet based on the PCDF process of thin titanium sheets is designed in this paper, which can provide a background magnetic field with good uniformity and high intensity. The influence of design parameters (coil size, wire size, number of turns, etc.) of several common coils (solenoidal coils, Helmholtz coils and runway coils) on the magnetic field uniformity and intensity in the forming area is analyzed by finite element method using the commercial software COMSOL. After that, the background magnetic field coil is fabricated based upon the manufacturing technique of pulsed magnets, and the PCDF experiments of thin titanium sheets are conducted. The results show that the background magnetic field magnet can increase the magnetic field intensity of the forming area by 5 times, and the magnetic field uniformity of the forming area can reach more than 95%, which greatly improves the formability of the workpiece.

Primary author: Mr DONG, Pengxin (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology)

Co-authors: Mr LI, Zhangzhe (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Prof. CAO, Quangliang (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Prof. CHEN, Qi (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Prof. HAN, Xiaotao (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Prof. LI, Liang (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology)

Presenter: Mr DONG, Pengxin (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology)

Session Classification: Thu-Mo-Po4.01 - Associated Technology II