Energy storage welding electromagnetic coil

Can a 7-turn coil be used for magnetic pulse welding?
Numerical simulation results showed that the peak pulse current is amplified with the 7-turn coil and the error is 1.40 %. The new coil requires less energy to realize magnetic pulse welding of dissimilar sheets.

What equipment is used for magnetic pulse welding?
Equipment for magnetic pulse welding consists of the following components: a transformer coil,with which the frequency and amplitude of the electric current discharge can be adjusted. BWI has a test setup that allows to investigate the applicability of the process for certain applications.

Which type of coil should be used for electromagnetic pulse welding?
As a general rule,thicker and materials with higher mechanical characteristics require superior discharge energies capable of providing higher impact velocities. When the generator has limited disposable energy,O-shape coilis a preferential choice for electromagnetic pulse welding;

What is the maximum energy of a welding machine?
The maximum energy of the welding machine is 50 kJwith a charging voltage of 25 kV. The following figure shows the coil in conjunction with the field shaper. The weld is stronger than the weakest base material : during material testing the crack appears outside the weld area.

How can a coil reduce discharge energy?
Therefore, in order to reduce the discharge energy (i.e., discharge voltage) while ensuring the peak pulse current, improve the energy utilization rate of the coil, broaden the versatility of the equipment, and facilitate the MPW between aluminum alloy plate and high-strength steel plate, an innovative coil is proposed in this paper.

What are the conditions for magnetic pulse welding?
A condition for magnetic pulse welding is that the material to be deformed needs to possess a good electrical conductivity. If this is not the case,the required energy to deform or weld the material increases. Another condition is that the surfaces to be joined need to be positioned in the overlap configuration.

Magnetic pulse welding (MPW), as an environmentally friendly room temperature solid-state welding technology, usually involves low energy utilization efficiency, resulting in the need for higher energy to achieve metallurgical welding. This study proposed an innovative ...

Since magnetic pulse welding is generally completed in the first half period of the discharge current, there is still a part of the magnetic field energy remaining, which will continue to maintain the coil current and eventually transfer to heat energy, so only a small part of the magnetic energy is transferred to electromagnetic

force on the workpiece. By changing the ...

F ? ? ¼ J ? ? B ? ?: (1) 3 Welding setup EMW requires a high voltage power supply, a bank of energy storage capacitors, a triggering system, a coil with

To solve the problem of energy loss caused by low energy utilization rate in the process of magnetic pulse welding (MPW), this paper presents a method to recover the energy after the first half wave of pulse current by using auxiliary capacitance. A detailed introduction of the working process of the improved discharge circuit was first carried out. Then experimental ...

When the generator has limited disposable energy, O-shape coil is a preferential choice for electromagnetic pulse welding; Quasi-static, dynamic shear tests along with fatigue test results ...

Overview of Energy Storage Technologies. Léonard Wagner, in Future Energy (Second Edition), 2014. 27.4.3 Electromagnetic Energy Storage 27.4.3.1 Superconducting Magnetic Energy Storage. In a superconducting magnetic energy storage (SMES) system, the energy is stored within a magnet that is capable of releasing megawatts of power within a fraction of a cycle to ...

By changing the circuit structure to regulate the current waveform, the purpose of reducing the unused magnetic field energy can be achieved, and meantime, the thermal energy of the coil can be reduced, and the service life of the coil can be increased.

In this paper, a highly flexible, miniaturized S-shaped stereoscopic coil was proposed to reduce the working area required for the MPW process. The required working area was reduced to 32 × 30 mm. Numerical simulations were performed to determine the most suitable coil cross-section size.

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