

Electromagnetic coil capacitor structure diagram

What is a capacitor-driven inductance coil gun?

The electromagnetic FEA model of the capacitor-driven inductance coil gun was constructed to be able to optimize the coil's dimensions. The driving circuit was implemented as a dynamic model for the simulation of current. The coil gun was not designed for really shooting applications, i.e. the projectile is accelerated to a relatively low speed.

What are the components of an electromagnet?

The device typically consists of an electromagnetic coil, capacitor, switch, barrel and movable core - projectile. The coil can be wound as a solenoid electromagnet with a ferromagnetic projectile placed at one of its ends (starting position). The launching process can be divided into three phases. The situation can be reflected in Fig. 1.

How does a magnetic coil work?

An intense transient magnetic field is generated in the coil and through interaction with the metal work-piece; pressure in the form of a magnetic pulse is built up to do the work. Data on formability of two aluminum alloys employed for exterior (6111-T4) and interior (5754) automotive body panels will be shown.

What is the electromagnetic field of the ejection coil?

The electromagnetic field of the ejection coil was modelled by FEA (see Fig. 3). cca 12,5 mH (with no ferromagnetic materials). With consideration of the higher, i.e. 30,8 mH. This effect causes a variation of time constant during the projectile launches. The force acting on the projectile at its different positions can be seen in Fig. 4.

What is the charging voltage of a capacitor?

Charging voltage is typically between 3 and 25 kV. It can be adjusted by changing the charging time. A low inductance high voltage switch or a set of switches are employed in order to discharge the capacitors through the coil. The blank is usually positioned in a close vicinity to the coil.

What are the steps in coil gun design?

This paper summarizes all important steps during coil gun design, such as physical laws of the coil gun, preliminary calculations, the testing device and the final product. The electromagnetic FEA model of the capacitor-driven inductance coil gun was constructed to be able to optimize the coil's dimensions.

This project shows the basic use of electromagnetic force to propel a projectile ball faster and faster through multiple coils that are fired as soon as the projectile reaches the next coil. This design has not optimized the timing or "suck back" effect, and is merely to show the fundamentals of how a coil gun operates.

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In this paper, a three-component coil sensor for SAFEM detection is researched and designed, which consists of three groups of mutually perpendicular receiving coils to receive three ...

A coil gun is a device that accelerates a projectile using electromagnetic force, which is generated around a coil when an electric current flows through it for a short ...

The diagram shows four different positions of the coil in an alternator, and the corresponding potential difference produced. Figure caption, The potential difference-time graph for an alternator

The multi-coil electromagnetic forming technology developed in recent years has shown unique advantages in improving the forming ability and controllability for both tubes and sheet metals.

3. Design of the Composite Sensor. As shown in Figure 2, in the composite sensor, a spatially periodic winding serves as both the excitation coil of the electromagnetic unit and the driving electrode of the planar capacitor. The excitation coil is a meandering structure, which can produce a more uniform electromagnetic field in the material under test (MUT).

The maximum value efficiency of the accelerator was found 4.19% with 200 V being supplied at 6-stage coil accelerator and 4.18% with 150 V being supplied at 10-stage coil accelerator.

The signal was recorded with five different voltages applied to the capacitor bank by the high voltage power supply. The maximal magnetic field at the center of the coil is noted in color in...

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