Deep Drawing A Solenoid Housing Damages The One Property You Specified

Cold work from deep drawing raises coercivity and lowers permeability. Why magnetic annealing is a process step in the route, not an optional extra at the end.



DEEP DRAWING & METAL STAMPING
Zhuji, Zhejiang, China

BALFORD.NET
shawn@balford.net
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Every deep drawn solenoid housing goes through the same contradiction. The drawing operation gives the part its shape, and at the same time it damages the magnetic properties the part was specified for. Those two outcomes are not separate problems - they are the same operation.

Here is what actually happens in the material. Cold work from drawing, bending or machining puts dislocations into the lattice, and those dislocations pin magnetic domain walls. Permeability falls, coercivity rises, residual magnetism increases. In a solenoid the visible symptom is a slower release when the current switches off - which the customer experiences as a valve that is not crisp, not as a metallurgy problem.

The effect scales with deformation. Two parts drawn from the same blank to different depths do not end up with the same magnetics, even in the same material, even on the same press, even in the same run. That is why "we use soft magnetic material" tells a buyer almost nothing.

Magnetic annealing is the step that buys the properties back: a controlled temperature, a controlled atmosphere, a defined cooling rate, which relieves the cold work and restores permeability and coercivity. It sits in a specific place in the process chain, and that place matters as much as the temperature does.

The practical consequence for anyone specifying a solenoid component:

- A grade name is not a specification. A number, a measurement method and a position in the process

chain are.

- Say which of the magnetic values are functional, and how they will be measured, the same way you

would for a diameter.

- Decide whether annealing is allowed before the part is quoted. If it is not allowed, the forming

route has to be chosen around that, and the price changes.

The longer version, including where the process step sits and how to write the requirement so it can be produced and audited, is here: https://balford.net/magnetic-annealing-solenoid-components/

I am the founder of Balford, a deep drawing and metal stamping manufacturer in Zhuji, China. We deep draw solenoid valve housings, sensor housings, bushings and sleeves for OEM programmes, on presses from 25 t to 350 t with a maximum draw diameter of Ø250 mm. When a drawing arrives with a magnetic requirement on it, the first question we ask is where that value is supposed to be measured.

SEND A DRAWING, GET A REAL ANSWER

Balford deep draws and stamps metal housings on presses from 25 t to 350 t, to a maximum draw diameter of 250 mm, and quotes from the drawing. **balford.net** · **rfq.balford.net** · shawn@balford.net