

3D printing drives design time efficiencies in custom inductors

3D printing has become increasingly familiar, and with its potential still being realised has found its way into many different industries. It is especially useful in the design phase for many different products, as parts can be manufactured on demand and do not need special tooling. Today, the wide range of available materials has enabled 3D printing to move into multiple fields.

Produce custom chokes and transformers faster

Customised chokes and transformers are an application where 3D printing is of great use, for both the engineer and the customer. Plastic parts are a main component of these products, as are specialised metal shapes which may be used for installation or cooling purposes. To get them in variable form in a short time and for a low price makes the work of the designer easier and helps to meet the requirement of the customer better and faster.

The technique is especially helpful in the following cases.

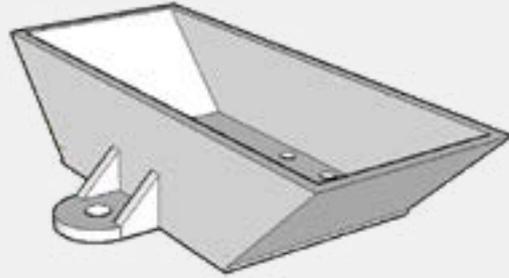
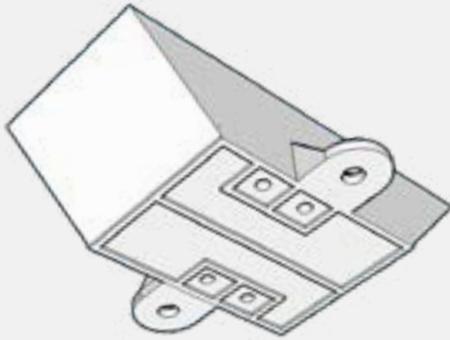
- Where special clearance and creepage distances are required – bobbins can be stretched to reach the minimum required distances between pins and cores. Separation surfaces can be additionally inserted to get an increased creepage distance.
- Bobbins for special core shapes – for example multiple stacked E-cores of ferrite or powder material, or customised amorphous or nanocrystalline cut-cores, require specific bobbins, which cannot be found on the market.
- Bobbins with multiple chambers for special insulation requirements between multiple windings.
- Special mounting requirements – such as snap fits for base plates and spacers.
- Customised cases – for example, if complete potting and fixed pinning is required.
- Customised metal heat sinks or heat pipes to get rid of heat (losses).

The following list shows a small selection of some interesting available materials.

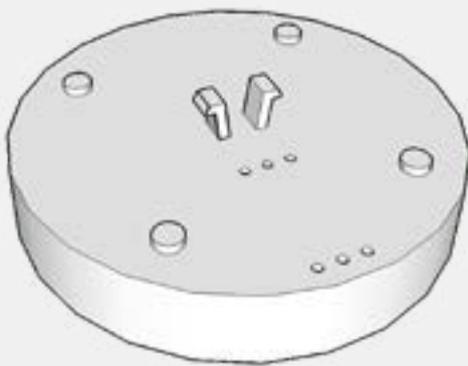
- Polyamide – even glass or carbon reinforced to resist higher temperatures and stress.
- Polyurethane – a more elastic but very abrasion-resistant material.
- Polymer resin – for mechanically stressed parts, including a transparent version.
- Silicon rubber – for very elastic parts.
- Metals – such as aluminium, (stainless) steel and bronze.

More materials with special properties (specific hardness, flexibility, insulation or thermal strength) are available from multiple providers.

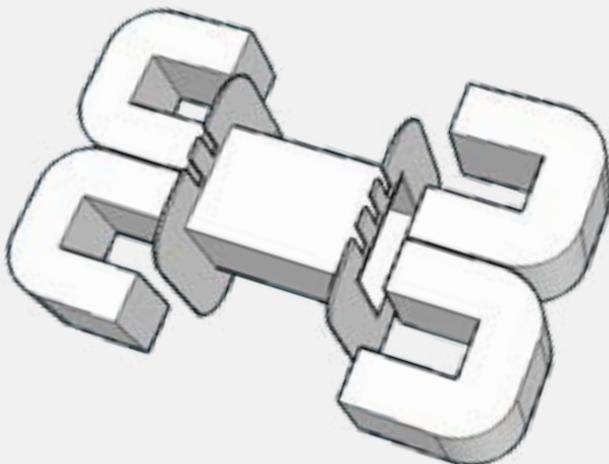
As the manufacturing time and cost for 3D-printed objects are decreasing, and the range of materials is large, it is a useful technique for prototypes. For small series production of chokes and transformers it may be an alternative solution compared with a soft tool, depending on the number and size of the 3D parts needed.



Customised base with screw fixture for the mounting of bigger toroid chokes



Customised case with snap-in hooks for horizontal toroid mounting



Customised bobbin for arrangement of two amorphous cut cores