

The additive advantage

3D printing, or additive manufacturing, is thought of by many as a prototyping solution. However, it is increasingly being used to manufacture finished products. Nick Allen of 3DPRINTUK explains to MEPCA the advantages 3D Printing can offer, and shares some examples of how the technique is being used.



Chances are you have used, or heard of 3D printing before, and you are likely to picture it as a load of wiggly extruded messy plastic lines that vaguely represent a prototype of the part you want to eventually manufacture. If you have used injection moulding for manufacturing, you will know it has high setup costs which require quantities of tens of thousands to make your product financially viable.

But have you ever thought about using the former for the latter?

How many times have you needed to produce just a few hundred small parts? And what are your options? CNC? Vacuum casting? Rapid injection moulding? If you haven't done so before, you should be adding 3D printing to that list.

Can additive be as good?

When most people think of 3D printers, they think of the extrusion type Fused Deposition Modelling (FDM) machines. These are generally not ideal for production as the quality can be low and speed of manufacture slow.

Resin printers using stereolithography (SLA), continuous liquid interface production (CLIP) or Polyjet technology have a higher quality surface finish, but they tend to be more expensive and produce brittle parts.

Powder bed fusion such as selective laser sintering (SLS) or multi-jet fusion (MJF) on the other hand offer the best of both worlds, scoring highly in speed, strength and definition. This makes them the only real choice for higher volumes of parts.

In terms of the finish of the manufactured part, 3D printing will not, at least for the near future, be as good as injection moulding; however, it does come a lot closer than

most may think. Over the last few years, 3DPRINTUK have invested over a hundred thousands of pounds into their finishing equipment to ensure part quality is high.

Additive manufacturing can also be a little restrictive when it comes to materials, 3DPRINTUK only stock one material, PA2200 Nylon. But the material is suitable for a wide range of applications. With a tensile strength of 48MPa, parts printed with the Nylon are perfectly suitable to relatively high-stress applications. Parts will give a solid snap fit and hold up in some of the harshest environments. It is, however, less ideal for thin parts (less than 1mm thick) where it is likely to be weaker than an equivalent injection moulded part, and can vary in strength depending on orientation due to the way a product is built up in layers.

Of course, 3D printing is not as cheap as injection moulding for large volumes, but it can be much less expensive than you

might think. 3DPRINTUK can produce parts from as little as 20p each, far less than the number you probably had in your head.

There is one significant advantage. There are no tooling costs. This means no financial barrier to entry for manufacture other than unit cost. All of a sudden the unit cost doesn't seem as bad.

Both of these factors do mean there are no economies of scale. Because there are no tooling costs, the unit cost remains the same no matter the quantity, and when factoring in those tooling costs there will be a crossover point where one approach is more cost-effective than the other. That said, 3DPRINTUK offer discounts for bulk orders that make ordering higher numbers a little more pain-free.

Another advantage is extremely short lead times. Parts can be produced in as little as 48 hours without the time delay complex tooling can introduce.

The technique also offers additional design freedoms and scope for complexity. Parts can be as complex as you want. Unlike with moulding, milling or cutting, there is near complete design freedom. As long as everything is above approximately 1mm thick, it'll print. One huge benefit to this is where complexity previously required a product to be made up from two or more parts that were each moulded, finished and assembled; you can now make that in one part, saving on multiple tooling and unit costs.

Is your part viable?

Additive manufacturing is not suited to every application and establishing if it is a viable option requires you to look at several factors.

1. How big is your part? Pricing is based on size. The larger the part, the less viable it is, but small components such as fixtures, fittings, etc., can be extremely viable.

2. How complex is the design? Complexity is no issue for 3D printers; however, it is for injection moulding. This means that the more complex the part, the higher the tooling cost, and therefore the greater the viability of additive manufacturing.
3. How many do you want? If you're looking for tens of thousands, then injection mould is a better option. If you need a few hundred, or low thousands, and the parts are small, then you're in the right area.

If you already have a moulding quote, 3DPRINTUK has a handy comparison tool on their website. Merely input the tooling cost and the moulded unit cost, along with the XYZ dimensions of the part, and it will produce a graphical cost comparison.

Essentially, the smaller and more complex the part is, the greater the viability of additive manufacturing.

www.3dprint-uk.co.uk

Manufacturers from a wide range of industries have turned to 3DPRINTUK to meet their needs.



Bloc Blinds: An award-winning Northern Irish blind manufacturer. Their BlocOut blind is the only blind on the market to be independently tested and proven to reduce home heating bills by up to 43% by reducing heat loss through the window using parts manufactured by 3DPRINTUK.



Suss My Bike: A UK manufacturer of mountain bike data logging equipment designed to tailor and tune your mountain bike suspension. Due to the size of the company, the size of the parts and the volume required, SLS was the only viable option to manufacture the parts.



Vanacci: A British manufacturer of high-end fashion accessories. The complexity of the design means that the parts can only be 3D printed, and the thin profile means that they are relatively cheap to produce. Manufacturing these additively also allows for customisation with no additional costs.