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RISE OF THE COBOTS

HOW COLLABORATIVE ROBOTICS IS TRANSFORMING THE SHOPFLOOR

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IN LIVING COLOUR

Yariv Sade, Director of Applications Engineering at Stratasys, takes a look at the potential of full colour 3D printing to overcome barriers of traditional design tools.

Over the past decades, the way businesses and consumers look at design has changed. While a product's engineering has historically taken centre stage when it comes to bringing it to market, the 21st century takes engineering excellence and product performance for granted. Today, if something is to stand any chance of enjoying the all-important successful launch and subsequent positive reception among target audiences, then it is product design that's king.

In a recent McKinsey study looking at the correlation of product design to business success, it was found that design-led companies have 32% more revenue and 56% total returns of shareholders than companies that place less focus on design. The results clearly demonstrate that companies that monitor consumer behaviour and understand a product's look and feel – from colour choice to surface finish – are ahead of the competition.



This holds true for nearly every industry, from automotive to consumer goods, and from healthcare and medical devices to consumer electronics.

The designers behind product concepts are therefore under more pressure to deliver the winning design; the next bestseller. The processes and tools at their disposal are numerous. However, there are still several barriers for designers to easily create realistic representations of their ideas during the design process, and accurately convey them to potential stakeholders and decision makers. A crucial challenge for designers is the CMF (Colour, Material, Finishing) process.

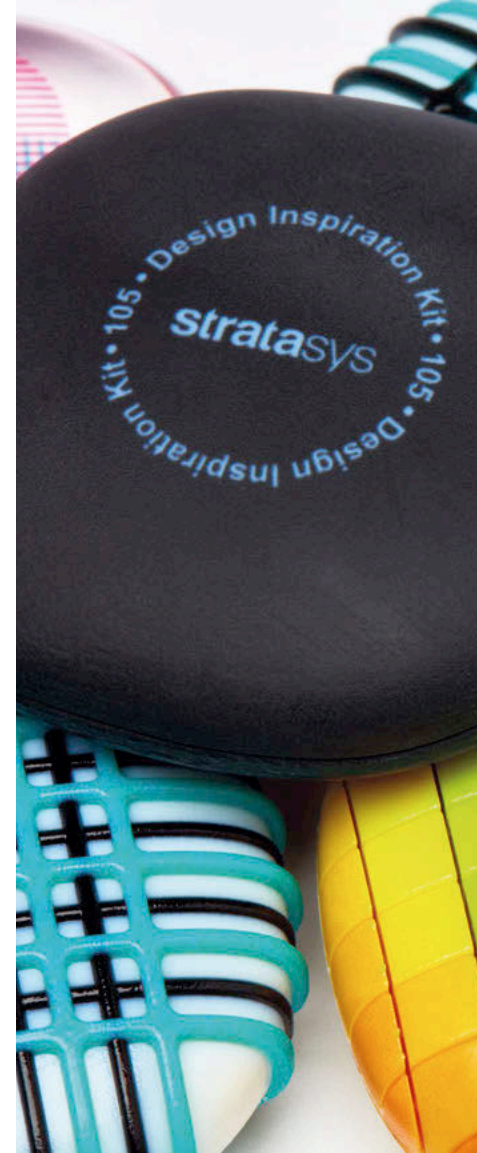
In design, CMF refers to the process in which colour, material and finishing is determined and selected for a product. Colour can refer to hues, saturation, shading and colour combinations within the design; materials reflect the

feel and character; while finishing is the texture and surface appearance – pattern, matte, smooth, shiny etc. These elements create the finished 'look' of a product.

The challenge many designers often face is that CMF is not integrated enough into the product development process – it is often only reflected perfectly in the finished product's look. This is largely because – if they are using it at all – design facilities in enterprises, design studios or SMEs often rely on, or are restricted to, single-colour 3D printing to create physical representations of their digital designs.

These prototypes are built to reflect the geometry and functionality of the design, yet they cannot represent more than one colour, nor reflect textures or finishes. The absence of an easy, fast and affordable solution to create full colour concept models or high-fidelity prototypes to test and present a product's geometry, functionality, and look and feel is an inherent issue

Design concepts are therefore split





One such technology is Stratasys' J-Series PolyJet 3D printing, which enables PANTONE validated full colour capabilities and a choice of up to seven different polymer materials – all united in a single print.

Providing up to 500,000 distinguishable colour combinations, the J-Series technology not only opens up unparalleled design freedom but gives designers the tool to fully integrate CMF prototypes into the ongoing design process. This saves both time and money, thanks to quicker decisions, improved CMF design iterations, and no external lead times for models.

Designers can use ultra-realistic 3D printed prototypes as a tool to convey and sell their design ideas to prospective customers and stakeholders. This can also raise confidence in the design idea, without dependence on different digital media.

This capability to combine different materials in a single print pushes the boundaries of design realisation much further. This opens up the possibility for improved design representation, as textures and different material surfaces can accurately be represented – from wooden textures, marble effects to glass. Combining this with PANTONE™ validated colour spectrums brings CMF directly into the prototyping process and enables designers to create 3D printed prototypes with such true-to-life accuracy that they are indistinguishable from the final product.

In terms of consumer behaviour and designing a successful product, full colour 3D printed prototypes also open up the opportunity of AB testing. The ability to undertake this market research with 3D printed prototypes (in focus groups for example) gives designers or stakeholders the opportunity to decide on the most popular CMF design for the product.

For designers, full-colour, multi-material 3D printing is the tool that enables designers to overcome existing CMF design barriers and realise product designs exactly as they envisaged. **!**

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over several media. Designers utilise textile samples and PANTONE™ colour charts, as well as printed and online images to determine CMF for new product designs. In addition, the product's measurements, geometry and build is reflected in a 3D file that can result in a basic single colour physical 3D-printed prototype – which can be painted or 'dressed up' to more realistically reflect the design idea. This not only makes it difficult to translate the design idea quickly and uphold faith in the product design when presenting it to stakeholders, but it also denies easy design iterations and accurate testing among focus groups or potential buyers.

In order to have a prototype final product at the end of the design process, some design studios outsource the creation of full-colour prototypes to global suppliers. This is in fact a US\$ 5.3 billion market, yet the delivery time for models is lengthy and usually takes several weeks. Furthermore, the associated cost can be several thousand dollars (for a 10-15cm long model). An added

challenge comes in communicating the exact CMF look to the external supplier – as the geometric shape is kept in a 3D file, yet the CMF information is carried in other mediums (images, slides, PPT, notes etc). Relaying design information from one person to another is therefore difficult, and leaves room for error. With such huge cost and long waiting times, designers typically only leverage this high-end outsourcing option to create a model of the finalised product for marketing purposes.

The answer – full-colour multi-material 3D printing is straightforward, yet still not that widely used within the design world. In fact, only a few leading corporations have leveraged the potential of this technology for their in-house design requirements. Those that have are granted the means to create ultra-realistic 3D printed design prototypes in little time, which can be iterated and adapted to deliver visually impactful designs.