[insert photo 1]

Introducing generative design

Generative design (GD) offers new opportunities for designers and engineers to expand the frontiers of their creative practice. The Machine Learning-based process can bolster productivity and help businesses stay at the vanguard of technological change within industries such as architecture, manufacturing, and beyond. So what even is GD?

Simply put, GD is an approach to design that quickly identifies solutions to complex planning problems. Users can use GD software to define constraints like manufacturing methods, materials, and cost, and then let the program generate a multitude of solutions that match those criteria.[1]

project delivery: a comparison

If the goal of any project lead is to save on time and costs while ensuring quick, high-quality delivery, GD may have an edge over traditional planning methods. But let's look more closely at its advantages when compared to other types of design.

[insert photo 2]

Unlike **direct modelling**, GD can rapidly present solutions that account for multiple variables, meaning designers spend fewer hours drafting and more time with the end product. If the proposals don't meet requirements - for example, if manufacturing or budget constraints suddenly change - they can easily alter the parameters to produce different results. The precision of its modelling means less material gets wasted in physical prototyping than with direct modelling.

GD also trumps other AI-based methods for creative planning such as **parametric design**. GD software is state-of-the-art when it comes to efficient and accurate parameter changes. Compared to parametric design, the iterative process can learn from previous renders to create even better designs going forward.[3]

creativity

To some, this may sound like handing the creative work of design over to an algorithm. But GD can mean that software and user work more harmoniously in tandem, multiplying the strengths that each brings to the table.[4] An in-the-box array of design solutions might be just the creative aid needed to scope new ideas and reimagine old ones.

[insert photo 3]

Generative design in action

endless possibilities: design by feedback

The possibilities may be limitless when it comes to applications of GD. When the process was applied to the design of a new office and research space in the MaRs Innovation District of Toronto, its application was twofold.

First, designers specified spatial parameters concerning the layout of neighbourhoods, circulation zones, and amenities into their software.[5] The program explored all permutations that satisfied these criteria, saving precious time that might otherwise have been spent in planning meetings or annotating draft documents.

But it was during the next stage of the project that the software came into its own. The programs' unique ranking function allowed designers to integrate user experience into their mock-up process, bringing qualitative data into the design process. The GD algorithm auto-ranked the initial solutions based on *objective* constraints according to the *subjective* preferences of end-users, a process that helped create more user-focused outcomes. [6]

[insert photo 4]

endless possibilities: data-driven footwear

In 2015 New Balance brought generative design use to a new audience. Working alongside the Nervous System GD studio, they came up with a way of customising soles to adapt them to an individual's running style.

In a triumph of data-design perfection, the companies devised a way to feed ergonomic data from customers into their program.[7] Perfectly fitting mid-soles were then printed off and sent out to users in a wholly automated process, from factory to foot.

Ventures like these may be just the beginning for GD, whose unique position at the intersection of art and technology could see it become the methodology *du jour* for all future-facing industries.

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