

*The following is a part of the Concrete Innovations series. This series features products and technologies that have innovated the concrete industry. Today's article is the third (and final) in the series, and it is focused on design. Part one's focus was on durability and disaster-proofing, while part two of the series was focused on sustainability.*

Innovation doesn't always have to be practical, even in the case of something as no-nonsense as concrete. Considering how durable concrete already is, some companies choose to focus on making it more aesthetically pleasing as well. Others want to change the way we think about building with concrete. These innovations are related to designing with concrete.

### ***Design Innovation 1: Magic Cement***

**Designers Frederik Molenschot and Susanne Happle have come up with a design for concrete that reveals a secret pattern when it gets wet. They generate contrast by using organic shapes like flowers on geometric blocks. The designs emerge when the concrete is wet. However, it doesn't take a large amount of water (like rain) to make the patterns appear; morning dew on a walkway or steam from a shower on a cabinet are enough.**



*A slab of the magic cement with water being poured onto it*

The design applications of this product are therefore nearly endless. In the home, the concrete (called “Silent Poetry”) could be used in sinks, countertops, or even as cabinets in bathrooms. Pool decks and patio stones could provide an outdoor use for the concrete. As for more public settings, sidewalks could reveal a pretty surprise when it rains; parks could also surprise and delight visitors with the concrete.



*Just some potential applications of the cement*

Ms. Happle’s website describes further applications for the project, stating, “the possible applications of solid poetry . . . are various: either at home in the bathroom, in the garden, in saunas and dance clubs, where the humidity is high or public spaces like bus stops or pavements. All forms of solid poetry have in common that they change the whole setting; they are surprising and have a life of their own.”

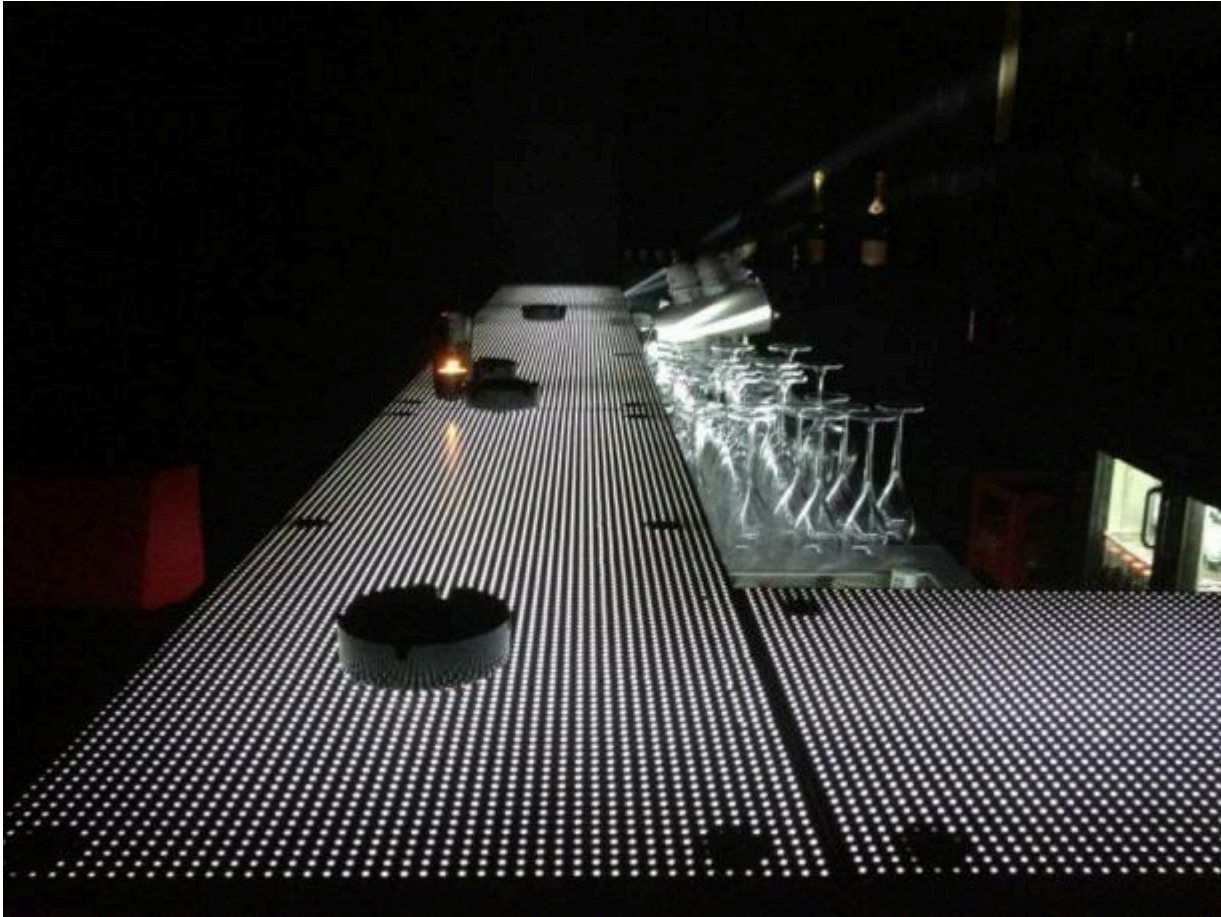
### ***Design Innovation 2: Transparent Concrete***



*An example of Litracon*

As a solid, opaque product, concrete has many interesting design applications. It can be painted, stamped, polished, and more. However, some concrete producers had a different idea. What if the concrete wasn't opaque? Rather than modifying the surface of the concrete to change its appearance, these designers decided to change the make-up of the concrete itself. By adding between 4-15% fibre optic materials to the concrete mix, the concrete becomes translucent. Although the first patent for "light transmitting concrete" was filed in Canada in 1935, the actual production of this product did not take off until much later.





*There are many potential uses for transparent concrete*

In 2001, Hungarian architect Áron Losonczi decided to mix concrete with glass fibres to achieve a more aesthetically pleasing type of concrete block. By 2004, he had patented his technology and formed a company to produce the concrete, called “Litracon.” This marked the first time that light-transmitting concrete was commercially available. Since then, numerous other companies have emerged as competitors, producing variations of Losonczi’s idea.

Luccon, Florack, and Gravelli’s LiCrete are just some of the products and manufacturers that use similar concepts to create translucent concrete. As explained by Lucem’s website, one of the main considerations for this kind of concrete is that a light needs to be able to shine through. This means the concrete can be artificially backlit or it can use the lighting

already present outdoors or indoors.



*Wall made of LUCEM's transparent concrete*

### ***Design Innovation 3: Inflatable Concrete***

**Our last innovation has less to do with the aesthetic aspect of design, and more to do with the actual building aspect of it. A big limitation of concrete is its inability to be used as a large shell structure. The reason for this is that concrete is so heavy, it would require an equally large (and expensive) frame to also be built. Researchers at the Vienna University of Technology in Austria have found a way around that problem.**

**Professor Koellegger of the university describes the process as the opposite of what is done with orange peels. Whereas an orange peel can be cut and flattened out, this concrete is laid flat and then rounded outwards. This is done by placing a**

**plastic air cushion underneath a flat slab of concrete. This concrete has carefully placed wedge-shaped spaces in it, as well as metal beams and a cable placed around it. These measures allow it to expand in the correct shape once the air cushion is inflated.**

**The air cushion pushes up the concrete, while the cable around the slab pulls inwards to create the desired shape. Although small cracks tend to appear, Koellegger claims that they do not affect the stability of the structure. He points to ancient examples to prove that as long as the concrete is shaped correctly, the structure is strong. Furthermore, he claims that plastering over any cracks will help to increase the durability of the structure.**



*The dome being inflated in Vienna*



As opposed to building traditional concrete shells, this method involves no timber frame, which greatly reduces the overall costs. Additionally, the lack of frame means that the process is much faster: in fact, their sample dome on the Aspang Grounds in Vienna took two hours from start to finish. On top of all the cost- and time-saving properties of this method, it is also extremely flexible from the design perspective. The concrete can theoretically be formed into almost any shape the designer can think up.

Sources:

*Magic Cement*

[Web Urbanist](#)

[Suzanne Happle](#)

*Transparent Concrete*

[Business Week](#)

[Canadian Intellectual Property Office's database](#)

[Hungarian Success Stories](#)

[Dezeen](#)

[Luccon](#)

[Gravelli](#)

[Florack](#)

[Lucem](#)

*Inflatable Concrete*

[Science Daily](#)