



CERAMIC GLAZED CONCRETE THE METAMORPHOSIS OF ELEMENTS

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In the tension field between technology and art, design and architecture Anja Magrethe Bache works to transform the strength and flexibility of concrete to ceramics – and the textural qualities of ceramics to concrete.

By Birgitte Kleis, architect M.A.A.

With a father that is a researcher of the inherent qualities of materials and a grandmother related to the Kaahler ceramic dynasty and her own comprehensive studies it was, in a sense, destined that the visual artist, civil engineer and Doctor of Architecture Anja Magrethe Bach is driven as the renaissance person she is by a need to create a syntesis between art and design, architecture and technology.

Anja Magrethe Bach is trained at the Royal Danish Academy as a visual artist in the Department of Sculpture. She is also trained as a Master of science engineer specializing in the design of composite materials and has earned a Ph.D in architecture at the Århus School of Architecture. Her thesis was an investigation of the architectonic potential of new concrete technologies. With this background she has worked for the past fifteen years to develop and transform materials in relation to their inherent aesthetic, physical and mechanical qualities. Her latest project financed by Realdania and titled 'Large Scale Thin Ceramic Glazed Concrete Facades', is a thorough technological and artistic examination into large-scale thin ceramic glazed concrete elements formed of high-density high-strength Close-Packed concrete.



Ceramic Glazed Concrete, suspended curtain-wall constructionpanels 160-50-1 cm and one panel 160 cm x 50 cm x 1-2 cm. Anja Margrethe Bache, Photos Ole Akhøj.

The project's proposition is to develop new properties in concrete and to then transfer these to ceramics in order to expand the application possibilities of ceramics and - not least - to endow concrete with the textural qualities of ceramic. The specific goal is to create one-storey elements that can be put into production and figure in a facade construction-either as a 'curtain wall' construction or as a self-supporting element.

Seen in an artistic and architectonic perspective Anja Magrethe Bache hopes that her work can con-

Ceramic Glazed Concrete two panels 160-50-1 cm. Anja Margrethe Bache, Photo Ole Akhøj.



Ceramic Glazed Concrete, 160-20-1 cm. Anja Margrethe Bache, Photos Ole Akhøj.

tribute to creating space and urban connections that affect (impact) us in new ways.

” I am passionate about the artistic processing of facades and materials that, with their weight and presence affect us. In my work with these ideas I want to pose questions and impact our existence in the world. In designing facades, I am preoccupied with investigating their materiality, their patterns and play of light and shadow and, through this, I hope that my work can contribute to accentuate, confirm and express qualities in building construction and the urban spaces they occupy”

CONCRETE AS A DESIGN MATERIAL

Recent developments in concrete technologies - amongst others by Compact Reinforced Composite (CRC) - has paved the way for producing large-scale thinner elements and constructions in a lower material thickness that are more flexible and can bend. These technological advances enable Anja Magrethe Bache to see concrete as a design material that can be compounded and transformed in a way that precisely meets both specific design functions and the mechanical performance levels one aims for.



*Ceramic Glazed Concrete, suspended curtain-wall construction panels
160-20-1 cm. Anja Margrethe Bache, Photos Ole Akhøj.*

In other words, it is about designing the material for a specific use and ensuring that, after changes, the material continues to behave predictably as it should. Anja Magrethe Bache has through her research concluded that not all types of concrete have the properties or disposition that adapt to change and has therefore chosen a high-density, high-strength concrete that remains dense and thus strong after she has performed mechanical fracturing and technological material changes on it - in addition to firing and glazing it. One might wonder why Bache doesn't work with clay and ceramic glazing of clay which is a familiar and proven technique. There are a number of reasons for this:

” The fact that I choose to glaze and fire concrete at all is because some concrete types has a number of technological possibilities that ceramic does not have - in contrast to clay- those concretes does not shrink when fired nor do ceramic-glazed concrete elements after correct mechanical



fracturing design become brittle or crack and break as fired clay does when produced in large-scale pieces. On the other hand, I think that sometimes concrete can develop an ugly patina while at the same time I am in love with ceramic surfaces tactility and textural qualities and, in a sense, I want to translate the possibilities of concrete over to ceramics - and ceramic's qualities over to concrete. This is why I have re-designed concrete in such a way that I can create large-scale thin elements that can simultaneously acquire a distinctive and new visual and aesthetic character through glazing and firing ”.

DESIGN IN A BROADER PERSPECTIVE

According to Anja Magrethe Bach it is necessary to develop new types of concrete and glazes concurrently because their interrelationships – glaze, concrete's chemical makeup, and its mechanical qualities - affect each other when fired and is therefore necessary for them to adapt mutually during the process itself. In an example of one trial - two identical concrete samples were glazed then fired-together but wound up with very different results. Where one came out looking like volcanic lava on its surface the other took on a characteristic blue-green glaze with air bubbles. The reason for this difference in appearance is simple - the one sample contained a single ingredient that was not in the other.



Ceramic Glazed Concrete, suspended curtain-wall constructionpanel 160-50-1-2 cm. Anja Margrethe Bache, Photos Ole Akhøj.

This means that each time a parameter is changed it has significance for the other components and Anja Magrethe Bache has designed accordingly - working on all areas simultaneously. She calls this process 'Design in a Broad Perspective' whereby design and form work figure into this process and she uses as inspiration abstractions of architectural drawings, layouts, urban and elevation plans and sectional views. The results are stringent two and three dimensional objects that with the help of light and shadow create spaces and intervals and react with its surrounding's intrinsic character and quality.

This design investigation by Anja Magrethe Bache took place at an artistic residency at the International Ceramic Research Center ,Guldagergård. The form experiments from here were further developed and realized in their final form as groundbreaking (new) facade elements at a National Art Studio residency.

Ceramic Glazed Concrete, suspended curtain-wall constructionpanel 160-50-1-2 cm. Anja Margrethe Bache, Photos Ole Akhøj.



FACADE EXPERIMENTS

The original ambition was to explore the technical construction possibilities of four different facade solutions. First and foremost a suspended curtain-wall construction, secondly a self-supporting facing construction. The third is a solution whereby the glazed ceramic concrete element is cast together into a sandwich construction with another concrete element. Lastly, a try at a hollow ceramic-glazed concrete facade semi-manufactured piece that would act as a casting mould to embed insulating light-weight concrete into.

Anja Magrethe Bache has in the meantime decided to concentrate on the first two solutions because the ceramic process is slow and involves many complex procedures and (firings) that can take up to four days before the oven slowly reaches required temperatures before cooling down again. This has given her the chance to devote herself to the design of facade elements:

”I have in the design process allowed myself to fabulate - particularly over the suspended curtain-wall construction that can be nearly as light as fabric. I am fascinated by textiles structural (textural) play of light and shadow on fabrics and want to apply this to concrete. Naturally it is a slightly different story but concrete is a transformative material with which I have discovered that it is possible to produce a large element measuring 160 x 50 x 1-2 cm. so light that it appears to flutter in the wind. For the self-supporting facade it has been about playing with the relationship between surface and light in a three dimensional construction that is almost a sculpture.

In both experiments I have engaged in an artistic approach with the material(e)s dialogue between concrete and glaze and it is important to emphasize that my work is not a scientific investigation, but first and foremost an artistic / aesthetic examination of possibilities”.



Ceramic Glazed Concrete, selfsupporting facing construction 160-50-1-3 cm. Anja Margrethe Bache, Photos Ole Akhøj.

THE WAY FORWARD

In order to move on from the projects’ current ‘state of the art’ status towards viable construction materials, Anja Magrethe Bach is doing a series of tests that will demonstrate the concrete elements’ capabilities in relation to fracturing and strength, fire and frost.

Questions of economy, materiality, energy usage, and sustainability need to be documented. Even though Anja Magrethe Bache concedes that the production method of firing the concrete not once, but twice instead of letting the concrete reach its construction strength in a regular casting is expensive she is of the opinion that this method is cost-effective when seen in the perspective of a

Ceramic Glazed Concrete, selfsupporting facing construction 160-50-1-3 cm. Anja Margrethe Bache, Photos Ole Akhøj.



*Ceramic Glazed Concrete and wood, suspended curtain-wall constructionpanel 160-50-1-2 cm.
The wood is a part of the mounting system. Anja Margrethe Bache, Photos Ole Akhøj.*

buildings' lifetime. This necessitates, in the meantime, a break with the conventional stance which dictates that a facade is a singularly decorative element to be replaced every 10 to 15 years. Instead a facade should be expected to last for something closer to 100 years and incorporated into the design of a building from its inception says Anja Magrethe Bache.

The projects way forward would be a collaboration with a partner that can see the possibilities in an actual building project. According to Anja Magrethe Bache the concrete element corporation, Con-fac, has expressed an interest and with its new fully operational plant is capable of producing these elements. What is needed is a concrete building project led by a visionary developer with expert architects that want to contribute to a renewal of concrete elements aesthetic character. When this happens, Anja Magrethe Bache looks forward to a productive collaboration.

" To have my results used in a building project would be a dream come true - partly in relation to creating a dialogue with the surrounding urban space and partly to upgrade the elements in concrete construction technology. Obviously, the elements will change in appearance as they go through artistic and architectural reworkings - but I am nonetheless certain that my knowledge of technology and the way these elements work together in addition to my background as an artist will give any collaboration or project a positive advantage".



Ceramic Glazed Concrete and wood, suspended curtain-wall constructionpanel 160-50-1-2 cm. The wood is a part of the mounting system. Anja Margrethe Bache, Photos Ole Akhøj.