

# **LARGE SCALE GLAZED CONCRETE PANELS**



**ARCHITECTURAL APPROACH**

**ANJA MARGRETHE BACHE**



# LARGE SCALE GLAZED CONCRETE PANELS

## ABSTRACT

Today, there is a lot of focus on concrete surface’s aesthitic potential, both globally and locally. World famous architects such as Herzog De Meuron, Zaha Hadid, Richard Meyer and David Chippenfield challenge the exposure of concrete in their architec- ture. At home, this trend can be seen in the crinkly façade of DR-Byen (the domicile of the Danish Broadcasting Company) by architect Jean Nouvel and Zaha Hadid’s Ordrupgård’s black curved smooth concrete surfaces. Furthermore, one can point to initiatives such as “Synlig beton” (visible concrete) that can be seen on the website [www.synligbeton.dk](http://www.synligbeton.dk) and spæncom’s aesthetic relief effects by the designer Line Kramhøft ([www.spaencom.com](http://www.spaencom.com)).

It is my hope that the research-development project “Lasting large scale glazed concrete formwork,” I am working on at DTU, department of Architectural Engineering will be able to complement these. It is a project where I try to develop new aesthetic potentials for the concrete, in large scales that has not been seen before in the ceramic area. It is expected to result in new types of large scale and very thin, glazed concrete façades in building. If such are introduced in an architectural context as exposed surfaces and façade panels they will have a distinctive impact on the visual expression of the building and public open space in general. The question is what kind of impact. That is what I in this article attempt to answer through observation and isolation of qualities and possible problem areas for selected existing buildings in and around Copenhagen that are covered with mosaic tiles or glazed tiles; buildings such as Nanna Ditzel’s House in Klareboderne, Arne Jacobsen’s gas station, Erik Møller’s Industriens Hus, Bent Helweg Møller’s Berlingske Hus, Arne Jacobsen’s Stellings Hus and Toms Chocolate Factories and finally Lene Tranberg and Bøje Lungård’s Elsinore water purification plant. These buildings have qualities that I would like applied, perhaps transformed or most preferably, if possible, interpreted anew, for the large glazed concrete panels I shall develop. The article is ended and concluded with a discussion on how that could be done.

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## THE DREAM OF LARGE SCALE GLAZED CONCRETE PANELS

Years ago I was in Portugal and was completely enthralled by the many different ways in which glazed tile surfaces figured in an architectural context. Here were stories about house façades of yore with tile trimmings in various patterns and colours. There are contemporary examples, for example Alvara Siza’s Pavillion, where the large hung dull white concrete roof meets the egg- plant glazed tile wall. Here you are brought into the skeleton architecture of Caltrava, which at the entrance to the train and metro station is covered in crushed, cast-in white-glistening tiles. But what struck me most was Alvaro Siza’s outdoor swimming facility in Porto from 1966, where he frames a cliff plateau by the water with an outdoor pool in gray concrete, black wood boardings and at the entrance as antique vases, white shining glazed concrete tiles, where the wear of time locally has exposed the underly- ing concrete. With few means, Alvaro Siza directs the visitor away from the gray concrete tiles, via the glazing, into the shower rooms. We can take off our shoes and feel the smooth surface, we can through this sensation remember shower rooms and ap- preciate that here we can still experience the ocean smell, the sky and the roaring sound of the ocean that powerfully strikes the rocks. At that time, I had worked with glazed concrete in my Ph. D project in 1998, in my postdoc from 2002 to 2004 (Anja Bache, 2002) as well as in a later design development project from 2006 to 2008 (Anja Bache, 2007), though without it being the primary subject of the projects. But the dream, which had been awoken in Portugal, was still intact.

Front page: Glazed concrete with exposed non-glazed concrete part. Spatial studies of surfaces, concrete and glaze interaction. This page: Alvaro Siza’s Pavillion, the meeting between hung concrete-covered and glazed wall, via exposed armament bars in Lisbon, Portugal. Metro station in Lisbon by Santiago Calatrava with white-glazed tiles crushed into smaller bits and cast in concrete. Alvaro Siza’s outdoor swimming facility near Porto from 1966 with glazed concrete tiles at the entrance. Models and photos: Anja Margrethe Bache.



This is why I was very happy to in 2009 receive grants from the Realdania Foundation for a 2-3 year development project called; “Lasting large scale glazed concrete formwork.” This project is undertaken at DTU, department of Architectural Engineering and is besides the Realdania Foundation financed by DTU. Working with the project are partners such as C.F. Møllers Tegnestue A/S, Gottlieb Paludan Arkitekter A/S, Dalton Betonelementer A/S and Densit A/S. It is a project where possible glaze treatments for selected concretes are identified, concretes are designed for large scale ceramic constructions, new types of lasting formwork is developed and a new façade system is designed. The goal is to achieve qualities that are unknown for concretes and in scales that are unknown for ceramic material.

### THIN LARGE SCALE GLAZED CONCRETE PANELS

In the article “The Potential of Ceramics in Architecture,” (Ole Lislerud, 2008) ceramist and Professor at Oslo National Academy of the Arts, Norway, Ole Lislerud describes large, thin porcelain panels with sizes of about 3 metres x 1.5 metres and relatively thin thickness. They are manufactured in Jungdezhen, China. The panels are strong, but very fragile and in the manufacturing process before they are fired, they must be well-supported. But these panels are an exception. Normally, ceramic thin surfaces are today seen in building as mosaic tiles, tiles and panels. They vary from the 2x2 cm mosaic tile, the ca. 5-15 cm x 5-15 cm tile and the somewhat larger types of tile that measure up to about 1-1.5 meter x 1-1.5 meters in their largest type. If they get any larger, they are very vulnerable to shocks and not strong enough to carry their own weight. It is my hypothesis that it is possible, by redesigning the concretes, the glazes and the process, to manufacture much larger panels that still are thin, and despite deformations are break ductile. That means that they can bend consequentially to the impact they are exposed to without cracking or being destroyed. They will also, as for example happens during transport, be able to absorb shocks without breaking. Such large panels are then expected to minimize the use of materials and resources during firing of glazed surfaces, to last longer and be easier to process during manufacturing In the project I transform new concrete technology, Densit and CRC (Hans Henrik Bache, 1978, 1986 and 1992) to ceramics and develop the large scale strong and ductile glazed concrete panels. These will, if the development is a success, be used as lasting formwork where other concrete that need not be fired can be cast. That could for example be the 5-meter high circular column that is manufactured by lasting formwork, being pre-fabricated in a factory as a hollow thin-walled one-body cylinder, glazed and of concrete. This is then transported to the building site where it is installed and made ready for casting in situ. The large glazed concrete panels that are expected to be developed can also be used as thin hung panels or self-bearing thin panels with no back casting. In the project I will also design façade panels. They will, if the development is a success, and if you are aware of the maximum measurements for road-transportation, be 4 x 9 metres and have a thickness of 1-2 cm. That is roughly the concrete standard of elements’ area formats in 1- and 2-story buildings.

The glazed large-scale concrete panel will thus act for the extension of the whole element and not as it is most often seen, be divided into mosaic, tiles and joints. It will invariably affect the visual expression, the expression and articulation of the façade as well as the spatial rhythm and progress. I will examine whether large scale glazed concrete panels that enter directly into a dialogue with the format of the standard elements, can contribute new quality to aesthetic and architecture. What qualities are lost by moving up in scale, which can be transformed from smaller scales to larger, and how? This article is the introduction to this study. Here I consider selected buildings’ façades with mosaic tiles and other tiles, primarily in the Copenhagen area and pinpoint their qualities. Based on this I will in the end of the article discuss if they can be transformed to large scale and possibly state how.

*Studies of architectural space for the glazed and unglazed concrete surface. Photos: Anja Margrethe Bache*





Finally, I will attempt to outline some of qualities of the large scales. It is important to point out that such a study will be subjective, but I hope that it can serve as a point of discussion and work to narrow the area down. In the article, buildings mentioned are covered respectively with unglazed and glazed tiles and panels of clay. Some of them have the effect of being glazed clay material, but is really smaltite, small glass mosaics, while others are not glazed, but have been engobed or simply that there is colour play due to different placements in the kiln. All add to expressions that are unique in the public open space that is often characterized by glass, steel, concrete, bricks or plastered surfaces. Each example adds qualities to the public open space with their distinctiveness. The question is if it is possible to, in a similar way, develop distinctiveness for glazed concrete and if such in very large scales can add new qualities to the public open space.

## WHY GLAZED CONCRETE

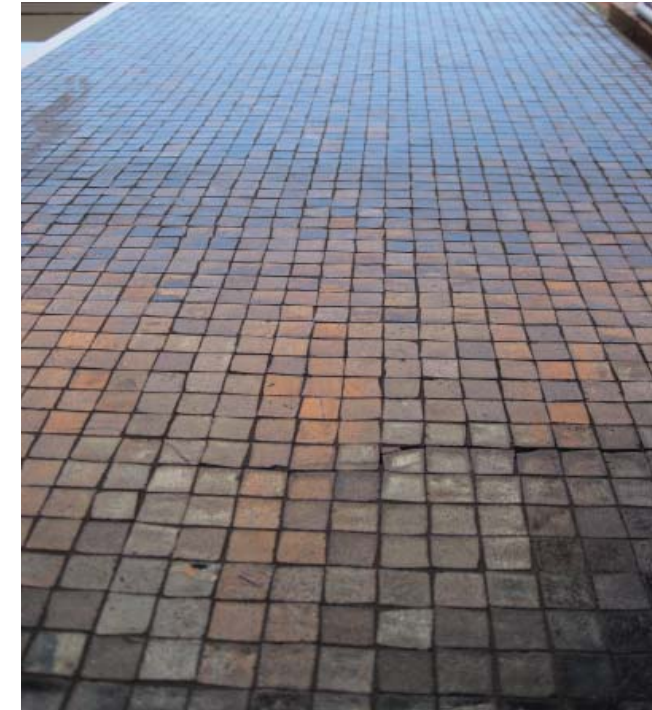
Ceramic glazed surfaces can be strong, very resistant to outdoor climate, have high durability and beautiful colour and textural expressions. Most people know them from bathroom environments, swimming facilities, but also from house surfaces, where they cover large areas as mosaic, tiles and in some cases larger elements. They decorate the surfaces while protecting them. They are easy to clean and maintain. These are the qualities wished to transfer to concrete. Concrete surfaces are strong also, can be very durable, beautiful and have various textures and surface patterns. But they also have tendencies towards chalk efflorescence and a patination that is not always especially favourable. They die out in the texture when painted and the dyed surfaces change when they come in contact with the environment in a way that is not predicted or desired. With glazed concrete the hope is to develop a dialogue between concrete and glaze that tells about the existence of both and thus adds new visual and aesthetic expressions, as it is the wish to achieve surfaces that remain as they were from the start or patinate beautifully and are easy to maintain.

In the article “Glazed concrete, Development of lasting large scale concrete formwork,” (Anja Bache, yet unpublished, 2010), it is described what types of glaze are used and what qualities can be achieved when concretes are glazed, while the problems of concrete and the transformation of concretes in ceramics are discussed in the article, “Ceramic concrete, development of lasting glazed concrete formwork in large scale.” (Anja Bache, yet unpublished, 2010) These are areas that are not discussed here.

### SMALL SCALE MOSAIC TILES

The reading of a façade’s materiality, colour, tactility, texture, patterns and rhythm depends on the distance of the viewer to the building and the context the building is in. Is it a dense area with narrow streets, as in medieval city centres, or is it a building in a deserted area outside of the denseness of the city areas and an entrance nearby, the sphere of intimacy and contact surface change. In dense city environment, where the facing runs from the foundation and upwards the detail of the building is experienced with centimetre to metre’s distance, you will be able touch it, hear its ring when you knock it, feel its absorption of heat, its granular or smooth surface, you will be able to taste it and as such relate to the façade of the building with your body’s senses, as is the case with late furniture designer Nanna Ditzel’s house in Klareboderne 4. In the 1960s, Nanna Ditzel chose to coat a formerly plastered building from the 1700s with Italian glass mosaic tiles; smaltite. These are tiles that are manufactured by melting glass and colouring oxides in a kiln, pouring the melted mass on a plate to cool off, followed by a manual cutting into the desired proportions and geometry.

*Late furniture designer Nanna Ditzel's house in Klareboderne 4 in the centre of Copenhagen. A façade covered in mosaic tiles. Photo: Anja Margrethe Bache*

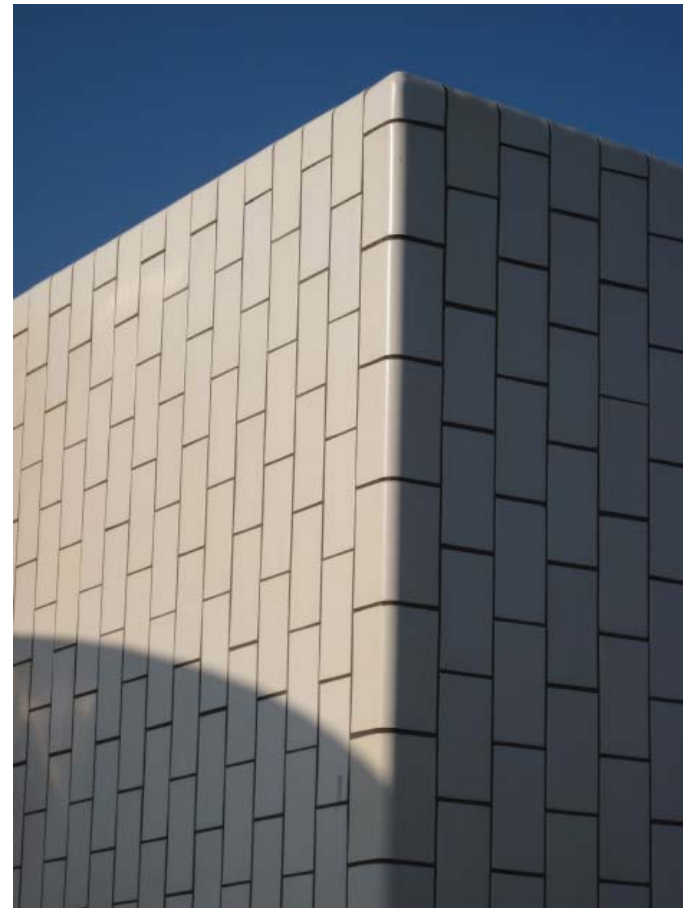


Smaltite is characterised by having varied thickness, colour and shape, as opposed to the industrially manufactured glass mosaic tiles, which stay within the well-defined proportion and geometry (Biggs, Emma, Hunkin, Tessa, 1999). Nanna Ditzel's house in Klareboderne is located on a narrow one-way street in the centre of Copenhagen with pavement on each side of the single car lane. It is possible to get very close to the building so you both see and touch the tiles of the coating. They are about 2 x 2 cm, with small divergences from the stringency of the square with oblique angles and uneven sizes. The primary colour changes from Prussian blue via cobalt blue to light gray in five stories, interrupted only by horizontal division fillets of smaltite tiles in a yellow-gold-ochre colour spectrum. At first look, the tiles of the façade are glazed clay tiles. But on closer inspection of corners and door and window sections, where the edge of the tiles is exposed, it is revealed that the tile is coloured through and made of glass. Here it also becomes apparent that the smaltite tiles are mounted or cast in light grey mortar. Normal mounting procedure for mosaic tile is to glue them to a surface and then mortaring the joints between the tiles and then finally washing the front so that any excess mortar does not cover the tiles (Biggs, Emma, Hunkin, Tessa, 1999). Presumably, the same method has been used in this case. If you touch the front of the façade you can feel unevenness. The tiles cover an even surface, but will, as a consequence of its variation of thickness even in the same tile, either be slightly angled relative to the surface or protrude or be submerged. Furthermore, the joints, which are slightly recessed, will add to the divergence from the surface of the façade. Day light as well as light from the houses nearby, the street lightning or cars, will in the multifaceted glass tiles and surrounding joints, produce dynamic, constantly changing shadow-light effects. The façade thus becomes a vibrant and living organism, or as a large textile, which in its texture plays with the light. Nanna Ditzel is known for her furniture design with its own rhythm and poetry in the details. Likewise, Nanna Ditzel has coated the building in its finest clothing, as with furniture, that even after 40 years appears natural and still patinates beautifully.

## LARGE SCALE TILE

Arne Jacobsen's gas station from 1939 by Skovshoved Harbour (Dahl, Torben & Wedbrunn, Ola, 2000) can also be experienced on close hand. Today it is a gas station with a car wash and an ice-cream shop with the best ice creams in the area. It can be seen from Strandvejen, which about three kilometres further up the road exhibits Arne Jacobsen's famous Bella Vista, or when you are refuelling both you car and your sweet tooth. The gas station, which is probably most famous for its continually casted mushroom-shaped eaves is an iron-concrete construction with a cubic building body coated with light grey, smooth, ceramic tiles industrially manufactured alike measuring 15 x 30 cm (Dahl, Torben & Wedebrunn, Ola, 2000). The 5 mm underlying, dark grey joints underline the limits of the tiles and separate the building's surfaces in repeated and staggered levels. The tiles and the deep joints with their detail and refraction of light contrast with the sculpturally formed mushroom, which looks as though it was formed in one-piece by the hand of a sculptor. The mushroom and the body of the building are connected, but separate in their expression. The body of the building attests to the perfection and standardized repetition of industrialisation. The surfaces of the tiles remain on the same level with the exact same colour and shape and does not, as the smaltite tiles, arouse curiousness. From far away the textile expression remains intact, but close-up it is dissolved into tiles and joints. The light is reflected and on hot days the tiles express a refreshing coolness and distance and in the winter they express cold. Only the scale of the tiles, which corresponds to an outstretched hand, that warrants closeness, but otherwise it is like a piece of art in a museum that is to be seen and not touched.

*Arne Jacobsen's service station from 1939 by Skovshoved Harbour with white-glazed tile boarding. Photo: Anja Margrethe Bache*





Should the whipped cream, with jam and sprinkles, from the ice-cream cone fall from junior's hand and hit the façade or a splash of oil or gas from a car were to soil the façade you know that no harm has been done. It can be wiped off with a rag and the tiles' light grey colours will once again appear in their perfect glory. Only the joints show vulnerability and seem open to change and aging as when we wrestle with them when we clean our bathrooms.

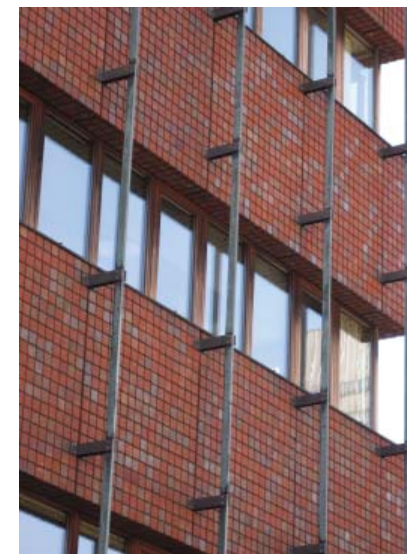
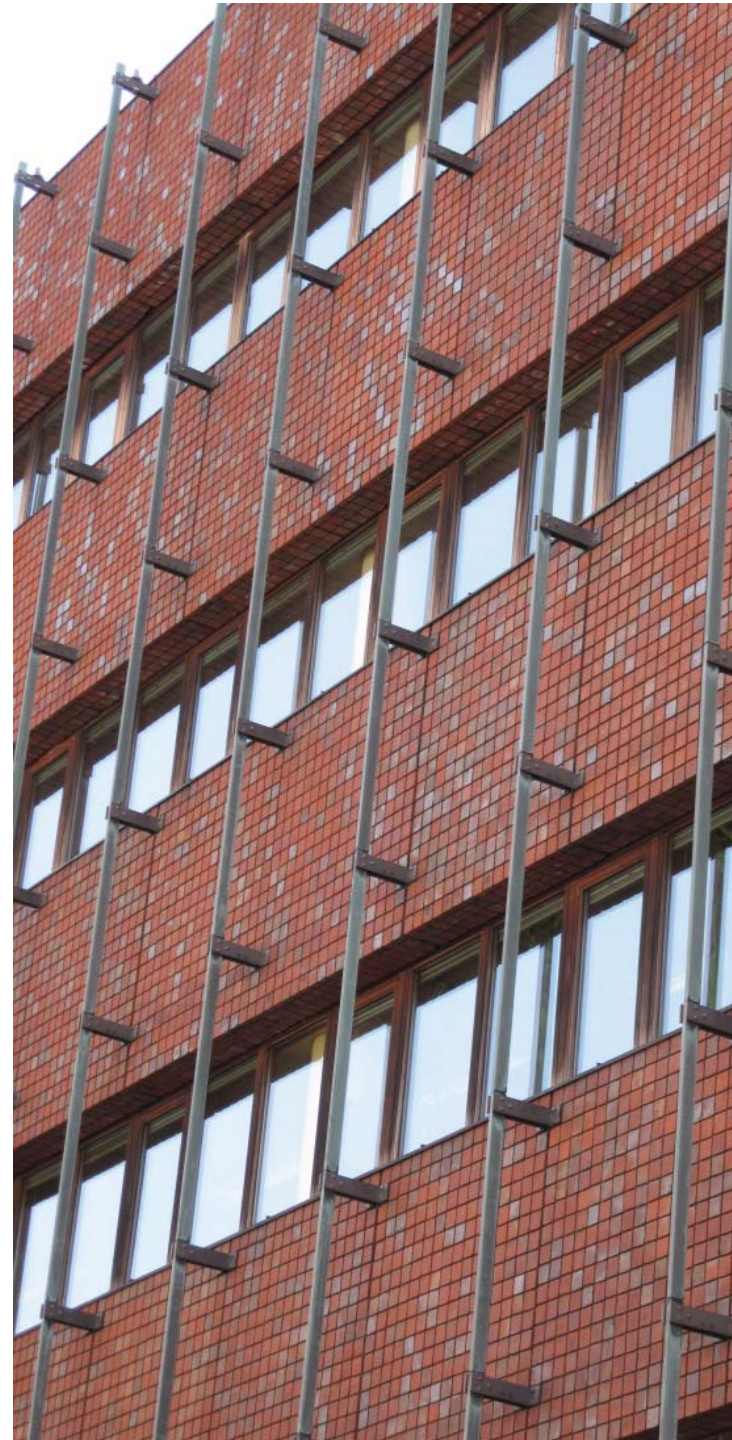
Industriens Hus by Erik Møllers Tegnestue is coated with clay tiles from the first to the sixth floor. Here the public open space is big enough to be at such a distance that the building, despite its large size, can be read as a whole. Industriens Hus has a front section that points towards Myrup's red brick-made city hall on H.C. Andersens Boulevard and a very long tail that follows Tivoli down Vesterbrogade (Arkitekten, 1975).

The building is seen up close from the pedestrian crossing or from bike or car when you travel by one of Copenhagen's primary thoroughfares. Industriens Hus is a building you pass on your way without really noticing the details since so much is going on in the windows or around you with the many passers-by. But if you choose to look upwards you will see a tile covering with much variation in colour and texture kept, however, in red and brown-black nuances. It is a quite messy building façade that wants to do many things and has many layers. This is seen for example in the vertical steel poles hung on the outside of the hung façade. The steel poles, that are meant to hold advertisements, accentuate vertical lines, whereas the division of the building in window fillets separated by tile façades points to horizontal linear sequences. It is not possible to touch the tiles, they can only be observed from a distance. This is kind of a shame, since a large part of the experience with tiles is the possibility of touching them, especially when they, as with Industriens Hus, change in both colour and texture and tells of large materiality.

Tile products have unusually many appearances that can be non-glazed in the many red-yellow colours of the clay, glazed with a myriad of colours, in more or less opaque, translucent and transparent types or they can be engobed, which in many ways is like glazing, but in reality is an easily melted clay type, possibly with colouring oxides. An orgy of colours can be achieved, but that is not the tradition in Denmark. Mostly subdued colours are used here, colours that enter into a dialogue with surrounding buildings of tiles, concrete, wood or glass. On Industriens Hus the tiles are exposed. They are neither glazed nor engobed. Nonetheless, they vary very much in colour and shimmer. Some are red, while others are almost dark brown, nearly black. There are tiles that seem entirely smooth as though they were glazed, while others are dull and seem porous and vulnerable.

On Arne Jacobsen's gas station we saw how the industrial process can manufacture entirely identical tiles. The tiles on Industriens Hus are likewise manufactured industrially, but here it is the kiln environment that offers the possibility of variation. The colour and texture of the tiles are thus a function of where in the kiln they have been placed and thus how close to the source of heat they are. That is what makes ceramic so interesting; that there are many factors to work with: materials and their cooperation, holding time, kiln environments, temperature curves and so on. It is not only exciting, but also challenging when a totally identical tile is to be manufactured in the thousands. But to return to Industriens Hus, this building's coating exemplifies the possibilities of variation in a standardized industrial process and thus suggests what neo-industrialism demands with only a few devices. Tiles measuring about 10 x 10 cm are cast into hung concrete panels, 16 horizontally and 19 vertically. The light grey concrete joints, or spaces, are visible, as are the more marked dilation joints between the concrete panels. The façade of the building is like a massive and fuzzy patchwork, sorted after the tight geometrical logic of the concrete element building. The tiles arouse a curiosity and desire of a close reading of each tile, but the distance prevents that. Oppositely, the distance of the reading along with the variation of the tiles' expression is what, like thousands of pixels in an image, make the façade vibrate.

*Indstriens Hus by architect MAA Erik Møller on the corner of H.C. Andersens Boulevard and Vesterbrogade in the centre of Copenhagen is coated with non-glazed tiles cast into the hanging concrete panels. Photos: Anja Margrethe Bache*





The tiles unfortunately must be wrapped in harlequin divided glass in the architect firm Transform's new version of the house. Thusly, another layer is added to the narrative. If you walk down Strøget in the centre of Copenhagen for a while you will get to Gammeltorv and Nytorv. In Gammeltorv you will find Stellings Hus, designed by Arne Jacobsen in 1937 (Møller, Vibeke Andersson, 2001). The façade of Stellings Hus is coated in light gray-blue smooth and glazed siegerdorf tiles and are both even, but also curved as the end of the façade boarding sequence and in softly rounded corner sections. The tiles are 52 x 52 cm and are set in cast metal anchors 5 cm apart (Dahl, Torben & Wedebrunn, Ola, 2000). The client, Stelling, was one of the leading paint dealers of the time and had the house made to house both the company's art supply store and offices (Møller, Vibeke Andersson, 2001). In a contemporary interpretation and idea of branding, this could easily have resulted in a façade covered with a myriad of colours, such as the canopy on the Santa Maria Market. Instead, Arne Jacobsen, on the modernistic building, chose to tone down the colours of the tiles in close dialogue with the sand-blasted, green-painted metal plates and window glass section of the lower floor. In Industriens Hus as well as in Det Berlingske Hus, which will be discussed later in the article, the tiles are non-glazed and the fired clay is exposed in more dull types. Here the light is not reflected, but disappears in the unevenness and porousness of the material and as such reveals something about the materiality of the tiles. In Stellings Hus the tiles are glazed and the underlying material is not visible. The clay tiles here begin to resemble the painted metal plate and the two are hardly distinguishable. The only thing that reminds the spectator of tiles is their size as well as the reading of the edge that is visible by the square windows. Here you see that the tile has a thickness uncharacteristic for the metal plate.

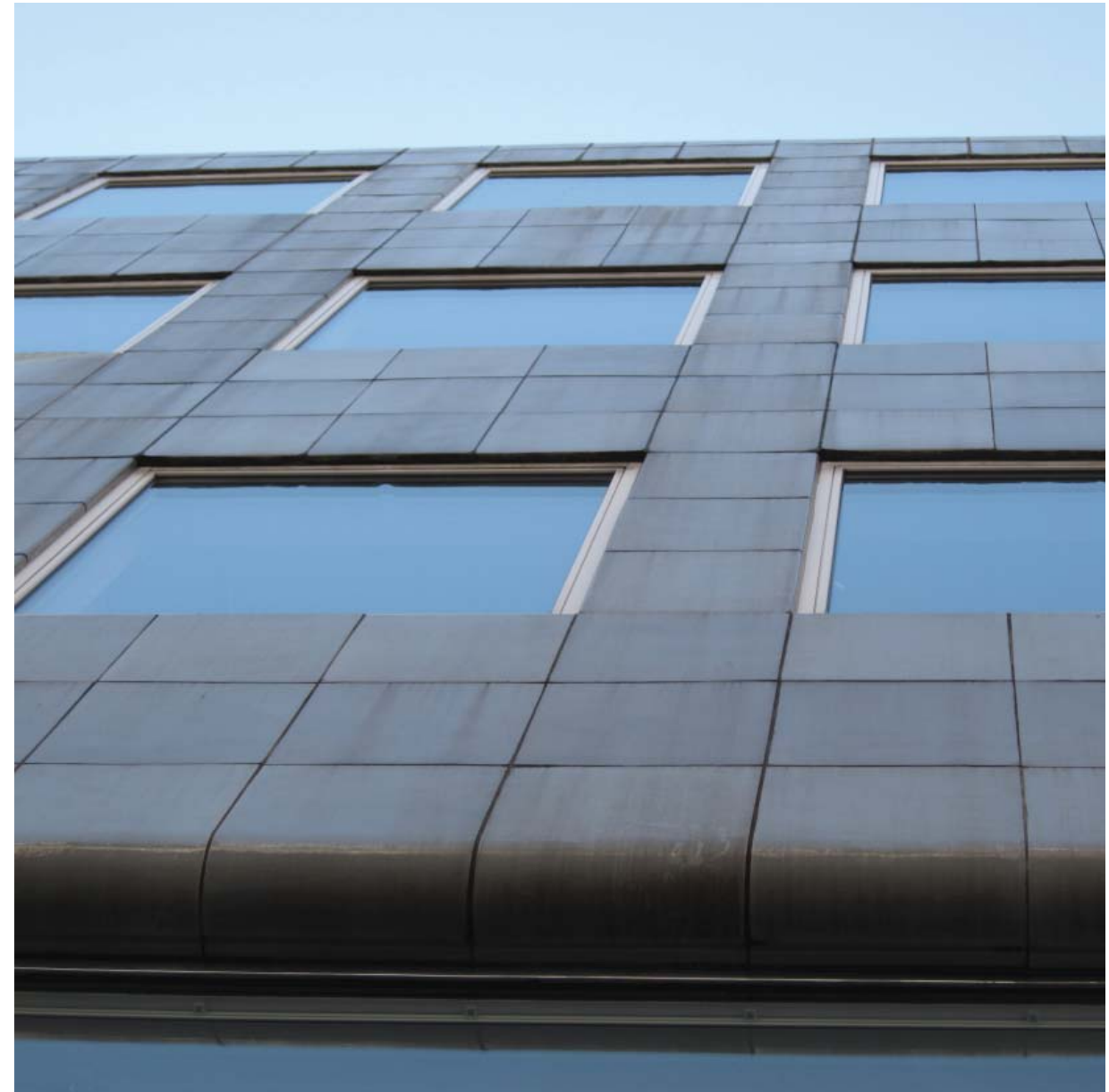
The size of the tile responds to the proportions of the window so there can be three tiles along the height of the window and three along its width. However, it looks as though the large tiles present some problems in working out for the entire building. As such, they are divided into smaller tiles split in halves in the rounded corners. I have a hard time understanding why it has been necessary, since the underlying tiles are not divided, but still are able to maintain the same size throughout. In Stellings Hus, the tiles are so large that they despite the larger distance of the reading do not have a textile expression. Arne Jacobsen's Stellings Hus articulates industry much more than the gas station on Strandvejen; it is as a premonition of the myriad of hung metal façades that decades later will follow.

#### SCULPTURAL TILE – SCULPTURAL EFFECT

Clay products can be formed to challenge three-dimensional space, for example with a generally sculptural form as those created by two of our most distinguished Danish ceramicists Betty Engholm with her geometrically stringent outdoor furniture or the ceramicist Karen Bennicke's numerous continuously surprising clay sculptures. It can also be through tiles that remain on the level but follow an underlying shape solution, such as is the case with EMBT Arkitekter's canopy from 2005 on the Santa Caterina Market in Barcelona. The facade is here covered in richly coloured level tiles. These have, however, been chosen to be so small that they approximately follow the richly curved surface of the canopy (Baena, David (et al), 2005). In Daniel Liebskind's proposal for the expansion of Victoria & Albert Museum in London, "The Spiral", the large level surfaces are consciously displaced so a relief expression emerges as breaking fractals (Liebeskind, Daniel, 2001). In Berlingske Hus, which used to house Denmark's largest newspaper, on the corner of Sværtegade and Pilestræde in the centre of Copenhagen, each individual clay tile has been sculpturally processed, with reference to the typesetting and printing methods of the day. Architect Bent Helweg Møller's Berlingske Hus, which is today occupied by shops, flats and offices, is from the first floor and upwards covered in yellow-ochre clay relief tiles of about 10 x 10 cm.

*Stellings Hus from 1937 by architect MAA Arne Jacobsen by Gammel Torv Nytorv in the centre of Copenhagen is coated in glazed hung Siegerdorf tiles. Photos: Anja*

*Margrethe Bache*





The tiles are cast into light grey concrete that looks as light surrounding joints in a network of vertical and horizontal lines. Each tile is a work of art in its own right, a one-of-a-kind piece of work multiplied with industrial manufacturing processes for the uniformity of the standard product.

The façade is thus covered in thousands of completely identically sculpturally formed tiles, cast in a negative form. The distinctiveness of tile fades in an unending repetition, fixed inside the area of the façade as a shimmering play of shadow and light that suspends the laws of gravity and mass and transfer to textile covering. Here there are no visible dilation joints between concrete panels or vertical metal fillets for hanging advertisements, here only the windows interrupt the tile covering and a tale of scale and the function division of the interior of the building. The level tile has here moved into the three-dimensional room, which though with the distance of the reading fades into a two-dimensional pattern of light and shadow. The sculptural effect wanes with distance, but surprises with a closer reading. Bent Helweg Møller's Berlingske Hus has recently been renovated and the tiles are brand new. Their colour is glittering and has still not been affected by dirt or developed any patination. It will be exciting to see how it looks in several years.

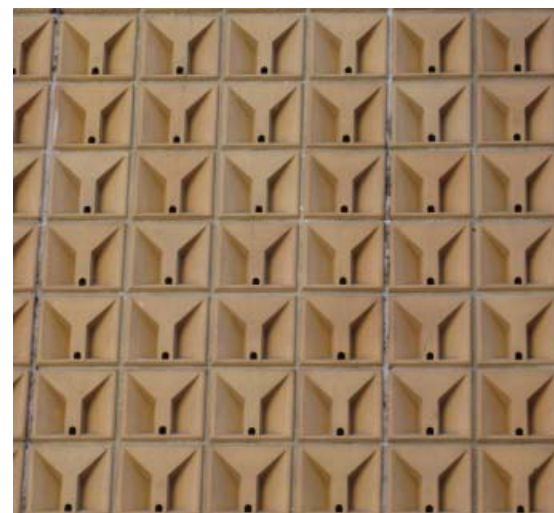
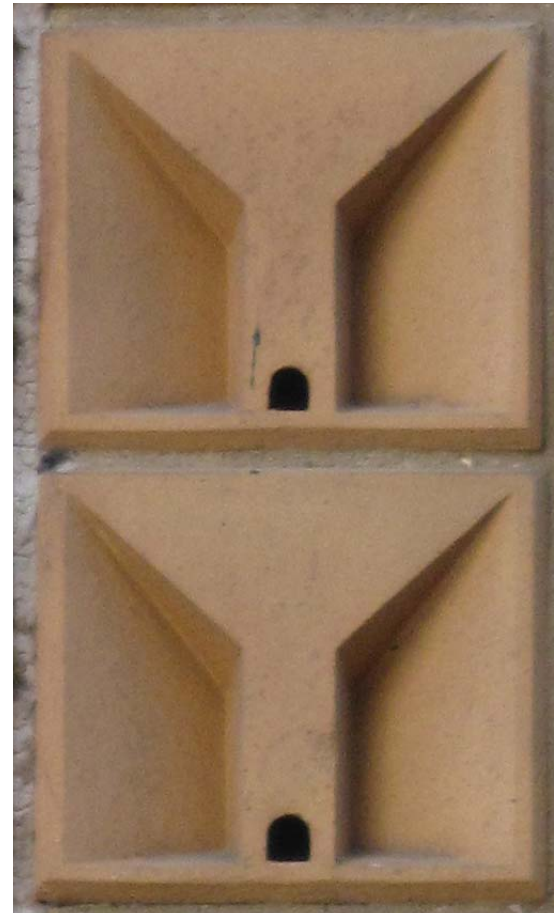
#### LARGE SCALE CONSTRUCTIONS WITH TILES

If we now move Northwest of Copenhagen we will find one of Arne Jacobsen's major works, Toms Chokoladefabrik. Here we move into one of the early Danish architecturally designed industrial buildings where both the broad outline and the small details have received much attention. Toms Chokoladefabrik was built in 1959-1961 on an entirely empty and very level field as a 23,000 square-metres production plant (Skriver, Poul Erik (ed.), 1962). It consisted of a two-story elongated and closed building body that in the front was vertically broken off by the six-story main building and by the cylindrical chimneys reaching for the sky at the back. The factory had roof light, but was in all other respects as closed as Pandora's box, with only the well-known TOMS sign on the main building suggesting that the factory manufactures candy and chocolate. From far away the building is experienced as a white, shining, monumentally sculptural mixture of stringent geometrical shapes such as cube, cylinder and rectangle, while it up close is dissolved into black vertical and horizontal lines of several metres in a uniform grid, which stems from the joints between the large, concrete sandwich elements of one square meter.

Toms Chokoladefabrik, 1959-1961, by Arne Jacobsen, is covered in white 5 x 5 cm glazed shiny tiles, cast into the metal frame of the concrete element. With up close examination, only bestowed to guests or employees, this grid as well is dissolved into a more fine-meshed grid, as a tale of the many 5 x 5 cm white, smooth tiles, which are cast into the metal frame of the sandwich element.

Toms' factories are still there and have the same tiled coating. However, much has happened, which unfortunately causes the building as a whole to lose its sculptural stringency and magic; there has been planted bushes and a large driveway as well as a large parking area in front of the building has been built and this prevents the building complex from ever being seen as a whole. Furthermore, the body of the building has been opened colour-wise through several large gates, which is scaled to the proportions of a truck, for delivery of products. These gates were there before, but had been kept in white colours, as the tiles were, and they therefore did not interfere in the monumental whole. The brown-green gate frames on the other hand stand out of the whole very clearly, though without beautifying it. These are openings that seem functionally destined, but to a lesser extent relate to the colouring and rhythm of the building. It had been favourable if the changes had been performed with more care and consideration of the visual expression and the gem Toms Chokoladefabrik used to be.

*Berlingske Hus on the corner of Sværtegade and Pilestræde in the centre of Copenhagen, by architect Bent Helweg Møller, is covered in non-glazed yellow-ochre clay relief tiles of about 10 x 10 cm. Photos. Anja Margrethe Bache*





In the 1960s and 1970s where industry was growing and new factories were built, one ugly, senseless industrial area after another with cheap, prefabricated elements shot up. These were often built in empty areas, where we did not have to consider their monotonous, grey repetition on a daily basis. Today, however, the cities have grown so much that they surround these industrial areas.

At the same time, there has for several years been focus on industrial plants designed by architects as branding and promotion of a company and finally, the factories have become more considerate concerning pollution, noise and odorous nuisances. It is therefore not entirely strange today to site large factories, or other industrial buildings, close to or in city areas, near habitation, offices or public parks. This also sets new demands for the appearance of these buildings. They now have to be able to enter into a dialogue with surrounding houses, offices and recreational facilities with regards to scale, materials, colour and texture. I think that Toms Chokoladefabrik easily did this in its original form with its stringent shape, its colours, lustre, materials and awareness of detail.

Another industrial plant that can enter into a dialogue with the residential buildings of the city is Elsinore water purification plant by architects Lene Tranberg and Bøje Lundgård. It acts as a small fortress, as a modern pendant to the much larger Kronborg Castle of Elsinore, but in a scale that matches the surrounding mansions. A ferry berth, the thoroughfare of Elsinore, railway lines and a residential street with old patrician houses, surrounds it. Elsinore water purification plant is behind a light grey, faceted concrete wall of 2 to about 4 metres, interrupted at the entrance where there is a series of cylindrical concrete pillars. These have through the workmanship of artist Lin Knutzon been covered in cast-in broken white tiles. The pillars are slightly staggered so that people walking around the plant can see the purification plant behind the walls. Here is a main building built in glass and steel, while the rest of the plant is covered in white, smooth tiles (Martin Keiding, 1998). The signalling value here is substantial; we have now returned to the swimming facilities, environments connected to water and cleansing; here the water is cleaned. Marketing is obsolete; the tiles tell the whole story. In Elsinore water purification plant we see the device that Arne Jacobsen also used in the gas station, the detail of the small tiles and joints between these contrasting to the continual material sequence, the mushroom in the gas station, the gray fortress and concrete walls also inside the water purification plant in Elsinore.

This creates a tension and a material-wise and scale-wise relation and difference that adds quality to both and accentuates distinctiveness. This will be lost by the use of large, similar panels; the question is if instead another form of dualistic tension can be achieved.

## DISCUSSION AND CONCLUSION

Several buildings with various types of mosaic and tiles have been described. Consequently, it is now possible to point to some of the advantages of using such materials. In the following I shall briefly outline these and then discuss if large concrete panels can offer the same qualities, transformed or entirely different qualities, as well as if there are any problems of using these. The article talks about qualities in relation to the distance of the reading and the context and in relation to perceiving the surfaces sensuously. It is the close reading, where you can get up close and touch, feel and taste that is found in e.g. Nanna Ditzel's smaltite tile-coated building in Klareboderne in the centre of Copenhagen and Arne Jacobsen's gas station in Skovshoved outside the city. Then there is the experience in the dense urban area, where it is not possible to touch, but only to see the described façades.

*The photos show the factory as it is today with the big gateways for trucks delivering or picking up products. Photos: Anja Margrethe Bache*



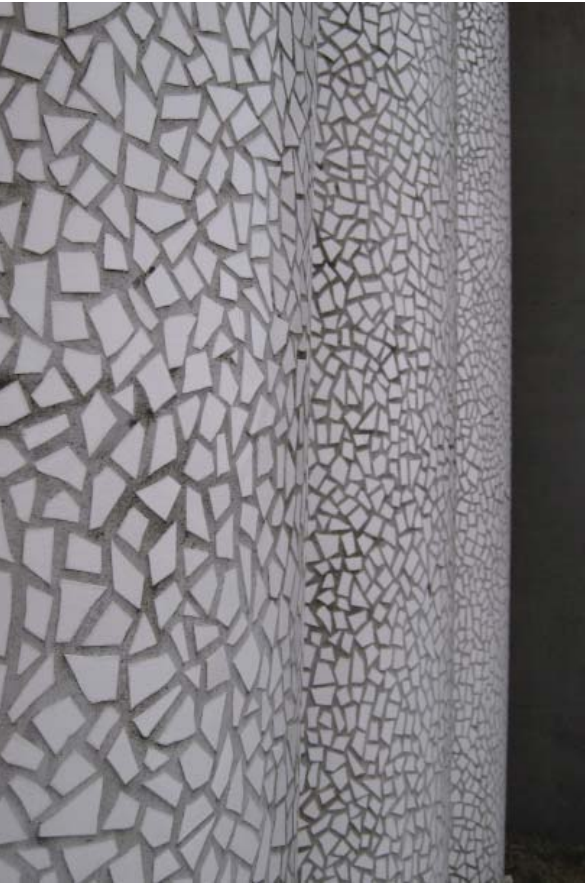


These are Erik Møller's Industriens Hus, Bent Helweg Møller's Berlingske Hus and Arne Jacobsen's Stellings Hus. Finally, there is the reading of façades from a distance on the mentioned industrial buildings; Arne Jacobsen's Toms Chokoladefabrikker and to a certain extent Lene Tranberg and Bøje Lundsgård's Elsinore water purification plant.

For the close reading of the building, where you can touch and feel, as well as for the close reading where you can only see, I have mentioned qualities such as:

1. Variety between the individual mosaic and tiles (Nanna Ditzel's house in Klareboderne, Industriens Hus, Elsinore water purifications plant and the rotundas by artist Lin Utzon).
2. Dynamic play between joints and mosaic (all buildings mentioned).
3. Shimmering colours in each tile (Nanna Ditzel's house in Klareboderne, Industriens Hus)
4. Richness of detail (all buildings mentioned).
5. Sculptural three-dimensional shape for each tile (Berlingske Hus).
6. Materiality (Nanna Ditzel's house in Klareboderne, Industriens Hus).
7. Sizes of tiles and mosaic relate to the scale of surrounding buildings' material and therefore enter into a dialogue with these (all buildings mentioned).
8. Colour, texture and lustre are generally subdued with not much difference to the appearance of the cityscape (all buildings mentioned).
9. Surfaces are clean, washable and reflect light, even on gray days.
10. Articulation of cleaning (Arne Jacobsen's gas station, Elsinore water purification plant).
11. Quality and attention to detail and choice of material (all buildings mentioned).

*Elsinore water purification plant by architects Lene Tranberg and Bøje Lundsgård and artist Lin Utzon. Here smooth, white tiles have been used. Photos: Anja Margrethe Bache*





These are all aspects that I believe are qualities for the selected buildings coated in smaltite tiles, and tiles. That is because they arouse our curiosity; we want to close-read and touch the façades with a sensuous approach to perception. The buildings thus become meaningful, bodily and attractive.

If we now move to a certain distance from the buildings, such as we did with Toms Chokoladefabrikker and to a certain extent Elsinore water purification plant, the details more or less disappear and then the qualities can be that:

1. The buildings can be seen as whole, as a monumental, sculptural shape.
2. The tale of the surfaces is simplified.
3. The glazed surface can be read as the same distribution as the pre-fabricated concrete elements.

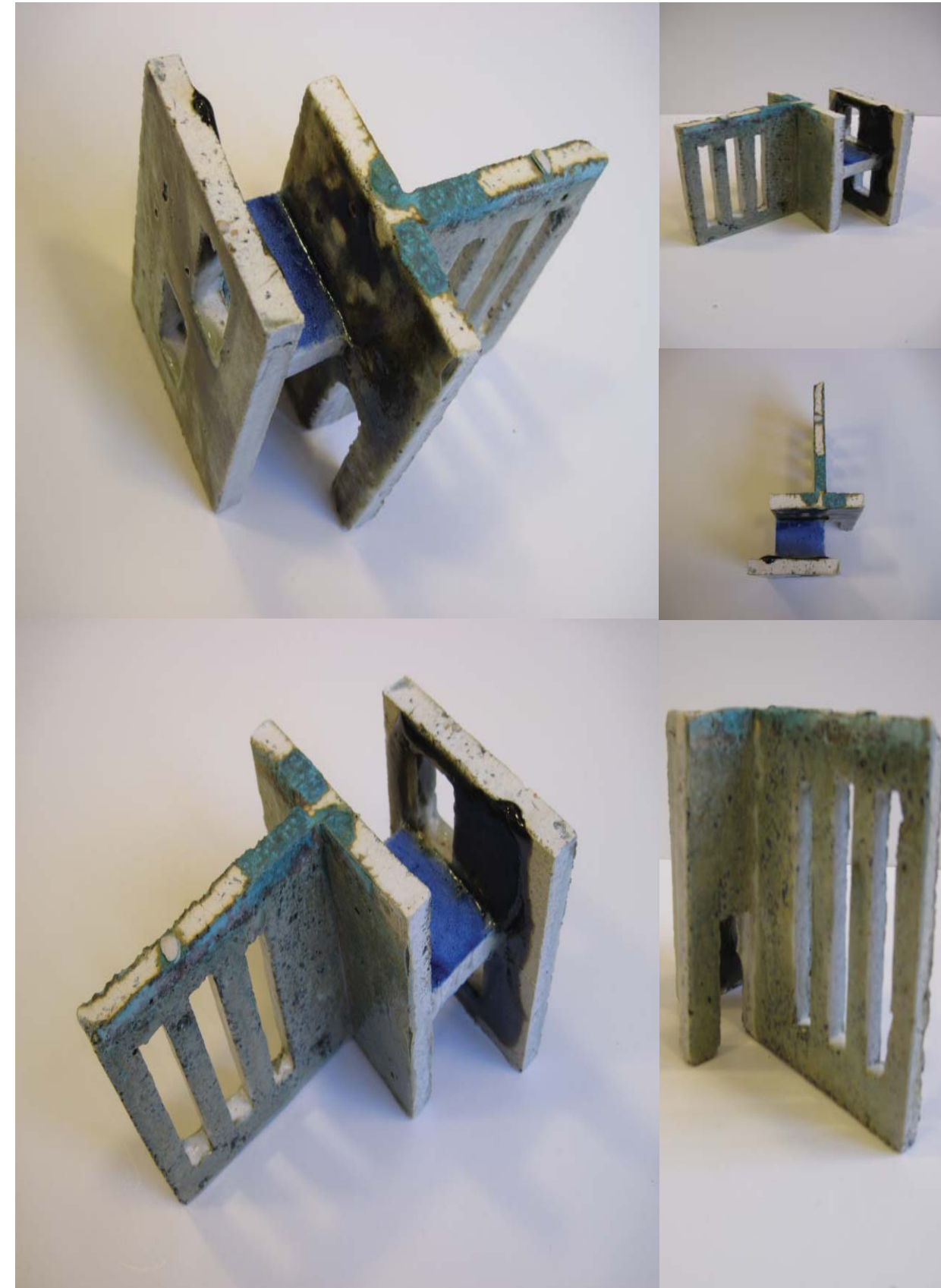
Besides the qualities of façades that stem from readings up close or from a distance, a quality I have also mentioned is that the building's appearance changes according to the distance of the reading, so it from a distance is seen in the unique sculptural shape, but up close reveals much richness in detail and dissolution into elements of smaller scale.

#### THE LARGE GLAZED CONCRETE PANELS AS FAÇADES, QUALITIES.

If we use large glazed concrete panels, whose colour and texture are even across the entire surface and also remains level, on building façades in the future, several aspects will be lost, for example, the dynamic textile expression that is created by using mosaic and smaller tiles in context with joints. There is also the dialogue between mosaic, tiles and the materials, for example bricks, that the surrounding buildings consist of. In many cases they have similar sizes. Finally, the relationship between the filigree expression found in the small tiles and for example the large unbroken surface, which is found in for example Elsinore water purification plant or Arne Jacobsen's gas station, will be lost.

The large panels will be able to cover entire sides of a house façade for smaller buildings and they will as individually connected plates cover the façade of larger buildings. The joints and spaces that emerge here will to the close-reader not at all have the filigree expression, which is characteristic to mosaic and tiles. Instead, the large, glazed concrete panels will be able to articulate the distribution of a building. This will be possible by the joints accentuating and emphasizing corner sections, foundation, the meeting of the ground, and the roof element. In multi-storey buildings they can articulate elements, floors and compartmentalization in the building as a whole. The large, glazed concrete surfaces will thus not enter into a dialogue with materials such as bricks, and also smaller buildings elements, but to a much larger extent with newer pre-fabricated elements such as glass sections in office environments, concrete element building and perhaps also plastered façades. In the latter example, large glazed concrete panels, with their smooth surfaces, could contrast with the dullness of plastered surfaces and as such another kind of relational tale about the materiality of both can be articulated. If the large glazed panels instead are made with glaze that shimmers and has a texture that can enter into a dialogue with the concrete body it can enrich both the detail richness and the close reading.

Glazes can have many colours and mixing them can create even more. There is also the possibility that the same glaze is far from unicoloured, but up close breaks up into smaller colour varieties.



*Spatial models, examination of juxtaposition of room-sized, glazed concrete panels and their effect. Models and photos: Anja Margrethe Bache*



Furthermore, it is possible to study the many different expressions of the concrete. It can be entirely white and unicoloured as the used concrete is when it is fired, but it can also be sanded down to half body and show the aggregate. Furthermore, fibres, if they are metal, will appear as black graphic lines in the white concrete body. If the glaze is chosen to be transparent or translucent, it can enter into a dialogue with the concrete body and play with its possibility of details.

It is also possible to take advantage of the concrete's ability to take practically all shapes in the same panel, for example in a relief effect, just as it is possible to engage in hang-fitting and back casting materials in the visual expression as its own poetry, rhythm and repetition.

The large, glazed concrete panels will also be easier to clean and maintain than the small tiles, because there are less vulnerable joints. As with the tiles, these will be able to articulate cleanliness and cleansing as well as, I believe, quality. In the article “Æstetiske og konstruktive synspunkter på facader af beton,” (Aesthetic and constructive opinions of concrete façades) by Svenn Eske Kristensen (1975), the article is concluded with a call for façades where the concrete material is utilized in a new and inspirational fashion. That is what I aim to do in my development project. It is thus my hope to, through various aesthetic, material-technical and process-related examinations, to develop new large scale, glazed concrete formwork and façades for future building that through a super user mindset can be a part of its own eco-system for the benefit of the environment.

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*Glazed concrete panels and Objects, models and photos: Anja Margrethe Bache*









