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CONTENTS

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NORDISK ARKITEKTURFORSKNING
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RENEWAL OF POSTWAR HOUSING ARCHITECTURE
DIFFERENT APPROACHES TO THE ORIGINAL TECTONIC IDEAL

CLAUS BECH-DANIELSEN

Abstract

This paper assesses Danish postwar housing architecture in relation to the concept of 'everyday tectonics'. It is argued that the extensive criticism of the architecture of the postwar housing developments is probably linked to their tectonic qualities, but that, to an even higher degree, it is also linked to the normative changes and altered perceptions of 'a good life' which appeared after the buildings had been constructed. Three generations of renovation and redevelopment of the developments are described and analysed, and three different architectural strategies are mapped. The first two strategies spring from a critical approach to the original architecture of the industrialised construction. The two strategies seek to break away from this architecture by altering the original buildings: either by changing their style or changing their tectonics. The third strategy neither breaks with the style nor with the tectonics of the buildings. Rather it insists on seeking out the potentials in the original architecture, which are supplemented by basic architectural qualities, for example daylight, a view, and user improvements. The results of the three strategies are discussed, however without leading to any conclusion as to which strategy gives the best results. Nevertheless, the paper does conclude that recent years have seen fine results from the third strategy, and that 'reusing' the existing architecture can be of special significance in the suburbs.

Keywords:
postwar housing, industrialised construction, renewal, tectonic, forming principles

Introduction

This paper focuses on Danish industrialised construction of the 1960s and the 1970s; the large social housing developments that were established in the postwar building boom. During these two decades, 600,000 new dwellings were constructed in Denmark (Lind and Møller, 1994). This was possible thanks to the comprehensive industrialisation of building construction at the time, when new forms of production and construction developed at great speed.[1]

With the industrialisation of the building process, it became possible to meet the huge housing shortage, which characterised the years following World War II. Seen in this light, the postwar housing developments were a success and a great step forward. The housing shortage of the time was successfully alleviated, and new healthy and functional homes were developed, surrounded by landscape qualities and recreational areas.

Never since has Danish housing production seen anything like the same level of productivity (Kristensen, 2012; Lind and Møller, 1994), and because the industrialised construction of this period made use of new forms of production, building materials and construction, it can be considered the largest 1:1 construction experiment in Danish history. Consequently, it is no surprise that the buildings of this period have since been plagued with enormous problems. These problems arose very quickly (Danish Building and Housing Agency, 1997), and the enormous costs of rectifying leaks in the flat roofs and damage to the concrete facades made it difficult to maintain enthusiasm for this revolution in structural engineering. The technique and its architectural outcomes were questioned, and it was debated whether this revolution in structural engineering was based solely on a desire for rational efficiency, meaning that the artistic and spatial qualities of the buildings had been forgotten in the process.

The debate is still very topical. Even today, large sums are being spent on renovating postwar buildings and a recurrent topic of debate is whether these buildings are even worthwhile preserving or whether they should simply be demolished to make room for new buildings. However, these buildings are home to many Danes who actually appreciate them (Bech-Danielsen, et. al., 2011), and since demolishing them is deemed both financially and logistically impossible, we have to debate strategies for their rejuvenation. This paper will take up the debate in the light of the concept of everyday tectonics; so let me start by providing a definition of this concept.

1 The so-called *montagecirkulære* (government circular on industrialisation) from 1960 required housing to be constructed from prefabricated elements in order to obtain financial support. This paved the way for industrialised construction in Denmark.

Everyday tectonics

In Antiquity, developing building techniques and structural designs was known as techne. This meant that working on the technical and constructional aspects of buildings was considered an art form; an art form with a special purpose. Furthermore, it meant that there was an artistic idea at play in work on building techniques and structural designs. However, in the 18th century, techne began to be referred to as technique (Frascari, 1984), and building techniques were gradually reduced to a mere 'means' in architecture (Ibid.).

This reduction of the technical and constructional aspects of architecture is being reassessed in architectural research focusing on the tectonic aspects of architecture. The modern understanding of tectonics is ascribed to Semper, and in this paper two aspects of Semper's definition of tectonics are of special interest. Firstly, that tectonic quality is the result of a deliberate artistic effort. As pointed out by Hartoonian (1994), this means that there must be an intention as well as an artistic idea at the foundation of tectonic work. Secondly, it means that the design and structural organisation of materials is the object of tectonic focus. This is also described by Frampton, who describes tectonics as «the focus on architecture as a constructional craft» (Frampton, 1995).

The concept of tectonics is therefore used to signify material properties and constructional intentions in architecture; the organisational principles of structural designs and their aesthetics. Beim summarises these arguments in her description of tectonics as that part of architecture which involves an artistic endeavour to express cosmic laws and cosmic order when forming and assembling the material (Beim, 2004).

In continuation of the argument that tectonic work involves an artistic idea at the foundation of the constructional assembly of building materials and building elements, it should be noted that this artistic idea materialises as a forming principle. The forming principle determines how the architect forms and organises materials and structures into coherent patterns and structures. In continuation of the second argument, i.e. that tectonic work focuses primarily on the design of materials, structural design and the design of building systems, it is worthwhile noting that in a traditional tectonic analysis of architecture, the functional content is considered of secondary significance.

However, in the development of the concept of everyday tectonics (which in this paper is understood as any tectonic work that will form the framework for ordinary people's everyday life) the functional qualities of architecture will have to be included to a greater extent. Everyday architecture becomes significant for its users as a framework for daily routines, and when it meets users' needs.

With this understanding of everyday tectonics, a discussion of the concept in the context of the architecture of modernism becomes interesting, because, with Louis Henry Sullivan's famous doctrine 'form follows function'[2], modernistic architecture stressed the significance of the functional in buildings; how the forming principle in the architecture of modernism originates from the function these buildings had. This puts modernism in conflict with Semper's traditional understanding of tectonic work, in which the forming principle stems from the materials and the structural designs.[3]

The focus for the architects of modernism was the physical framework surrounding ordinary people in their everyday lives.[4] The architects of modernism did not have to design centres and symbols of power, i.e. churches, castles and monuments. In the modern welfare system, power lay with the people, and this meant an entirely new assignment for architects, who now had primarily to create homes for the general public. This was architecture's new assignment, and this is where its new meaning was to be found.

This is key to understanding the concept of everyday tectonics applied in this paper: The focus on architecture as a constructional craft with the goal of creating an optimal physical framework for 'the good life' for the general public. And this endeavour manifested itself most clearly in the housing developments of the 1960s and 1970s. The housing development of this period still accounts for 37% of all Danish homes. As the architectural mass production of their time, these buildings are obvious examples of everyday tectonics.

In the following, the industrialised construction of the postwar era will be analysed in the light of this understanding of everyday tectonics. This involves both an analysis of the buildings in a traditional tectonic perspective, focusing on their production form, constructional organisation and material qualities, and an analysis of the architecture as a framework for everyday life, including analysis of the perception of 'the good life' which forms the basis for the design and organisation of the building. The analysis will try to identify a forming principle originating from the building technique and the building materials. Furthermore, the analysis will try to identify a forming principle originating from the perception of 'the good life' prevalent at that time.

Industrialised construction of the 1960s and the 1970s – tectonic organisation

The development of new materials, structural designs and production forms is pivotal to understanding the industrialised architecture of the postwar era. The large housing developments of this period were typically constructed from concrete. Already at the beginning of the 20th

2 Sullivan expressed the notion that 'form follows function' in an essay as early as in 1896. Here he writes: «Whether it be the sweeping eagle in his flight or the open apple-blossom, the toiling work-horse, the blithe swan, the branching oak, the winding stream at its base, the drifting clouds, over all the coursing sun, form ever follows function, and this the law … It is the pervading law of all things organic, and inorganic» (Sullivan, 1886).

3 However, as will be described below, modernism also contained forming ideas that originated from the materials and the structural designs used.

4 The Swedish architect Gunnar Asplund described this when he wrote that: «There has never been any doubt about what are the means and what is the goal in today's cultural life. Only the weary and the pessimistic are claiming that we are creating a machine culture that is a means in itself. We are working to organise the housekeeping of the world and to improve and create stable life conditions for individuals.» Rephrasing Pallasma, the architecture of the time was to reflect and materialize the perceptions of «the good life» (Pallasma, 1996).

century, when concrete was introduced as the most important building material in industrial construction, the pioneers of modernism were preoccupied with exploring the design possibilities of this new material; its tectonics. For example, there was keen debate about the enormous possibilities made available because of the large spans without structural support that concrete made possible.[5]

Architects found inspiration in the products and rational analyses of engineers, however this did not mean they were willing to dismiss the spatial and aesthetic qualities of architecture. The modernists saw the logical way of thinking and the rational calculations as universal regularities along with mathematical and scientific formulas[6] (Le Corbusier, 1923). The technical and rational calculations were considered the fundamental basis for developing aesthetic quality, which Vitruvius has defined by reference to similar universal regularities (Bech-Danielsen, et al., 2014).

In «Cinq points de l'architecture moderne», Le Corbusier outlined more specific examples of forming principles. Here, he specified how the new materials and forms of construction of that time introduced entirely new forming principles in architecture. With reinforced concrete followed new construction principles such as the slab-column system, which introduced entirely new spatial and design possibilities. Spatial elements such as outer and inner walls, their thickness and their position, were no longer restricted by structural requirements. As can be seen from the blueprints of Le Corbusier (see figure 1), this gave rise to a bold exploration of the design possibilities presented by concrete. For example, the horizontal window bands broke away from the facades of the past, which were divided into bays, the rhythmic division of which was conditioned by the structural requirements of the brickwork and the timber-framing techniques applied. It was time to explore the design possibilities of concrete, and as demonstrated by Le Corbusier, for example, this led to artistic freedom in the free facade and the the free design.

Postwar housing developments were made from concrete, although they were based on other structural principles. This applies not least in Denmark, where the concrete industry became a powerful player in the development of construction. Danish postwar developments were therefore built with prefabricated concrete elements along crane tracks, and, here, the logic was that the longer and more standardised these tracks could be, the more efficiently could they be exploited.

For many of the housing developments of the postwar era, freedom of design was therefore replaced by requirements for rational and fast production. The dream of rational mass production was imposed on the dream of freedom of design, and the break away by modernist architects from the classical formalism of the past ended up in most cases as constructional formalism. For example, this is what happened in the

5 The Danish functionalist architect Poul Henningsen drew attention to this saying that, «Previously, one had to work with small spans and extensive structural support. However, reinforced concrete can span large stretches without support» (Henningsen, 1927, p. 30).

6 «The Engineer, inspired by the law of Economy and governed by mathematical calculation, puts us in accord with universal law. He achieves harmony» (Le Corbusier, 1923, p. 1).

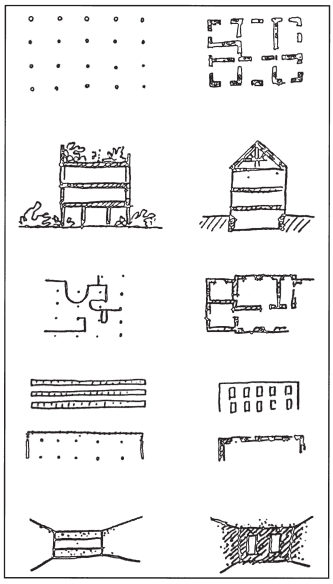

Figure 1
Le Corbusier's «Cinq points de l'architecte moderne» can be seen as a development of new forming principles that were developed on the basis of the new materials and the new form of construction available at the time.

Hedebo housing development in Roskilde (see figure 2). The modernistic ideals about horizontal window bands were complied with to the extent that, paradoxically, they clashed with another modernistic ideal, i.e. the ideal that form should follow function. Due to the horizontal window bands on the front facades, windows are placed inappropriately in the stairways and the buildings are therefore reminiscent of the historicism buildings of the 19th century in which the external rhythm of the facade dictated the internal design.

Systematisation and standardisation made sure that the same plan and facade arrangement could be used again and again – throughout several stories and several consecutive housing blocks. The building design could thus be «mass produced», in long rows that could be cut and repeated as required. However, this did not lead to design experiments with repetition as the artistic motif (Bundgaard, 2011). In the arts, the concept of montage had already been explored for its artistic potential (Ibid.), whereas in architecture this technique was developed solely from a constructional perspective. The 20th century's artistic interest in the concept of montage did not rub off on the architecture of the postwar era, and the tectonic qualities of the buildings were rid of their artistic idea, leaving behind only a rational building technique.

Industrialised construction of the 1960s and the 1970s – framing everyday life

I began the Everyday tectonics section by referring to the introduction of the term technique in the 18th century. Let me therefore start this section about industrialised construction as the framework for everyday life with a reference to the 18th century: Ever since the Enlightenment,

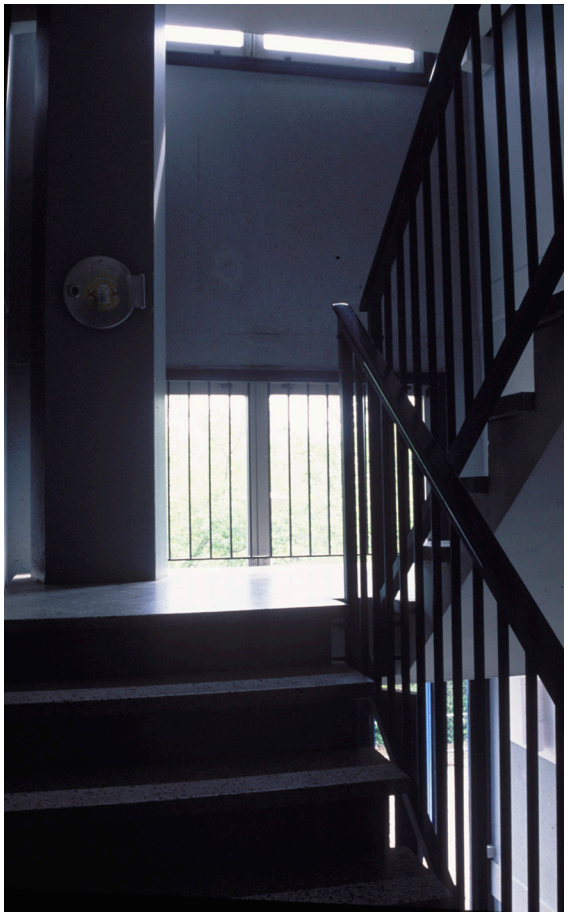

Figure 2
«The tectonics of the crane track» in the Hedebo development in Roskilde. Because of the horizontal window bands, the windows are inappropriately placed in the stairways. The buildings are therefore reminiscent of the historicism buildings of the 19th century in which the external rhythm of the facade dictated the internal design. In the Hedebo development, the formalism of historicism has been replaced by a constructional formalism.
Photo: Claus Bech-Danielsen.

architecture has been considered a means to improving the habits of humans and creating a better society. Furthermore, towards the end of the 18th century, the notion arose of architecture as an effective tool in efforts to alleviate a number of social issues in society (Werne, 1998, p. 135).

According to this notion, architecture is not merely a physical framework for everyday life; it is a space that contributes actively to development of 'the good life'. This became apparent with the modernistic housing architecture of the 20th century, in which 'the home' was not only to reflect modern life but modern life was to be visible in the realisation of the orderly and well-functioning architecture (Bech-Danielsen, 2004). Architects were not only meant to create a good framework for modern life; they also saw themselves as the creators of modern life (Ibid.).

This same philosophy was at the foundation of the industrialised construction in the postwar era. The architects of the time wanted to promote 'the good life' in the suburbs, and the plan was to achieve this through mass production of housing that would make it possible to move large sections of the population away from the miserable conditions of the cities. The new developments of the suburbs had to be light and airy, with recreational possibilities, landscape views, good community facilities, easy access to shopping, and functional homes. At these developments, residents were to become good citizens that could take an appropriate part in the new democratic society.

Therefore, the desire to eliminate the housing shortage formed the basis for development of industrialised housing production. In order to make mass production possible and, thus, make good architecture affordable to everyone, architects had to make their buildings as standardised products. Furthermore, because they wanted to develop standard solutions, they applied a generalising and universal view of man. «All men have the same organism, the same functions. All men have the same needs», wrote Le Corbusier (Le Corbusier, 1923, p.136). Via rational analyses, the architects of the time sought to identify the universal housing needs common for all men – not of the individual but of the average individual.[7] In this way, architecture was in line with the political ideals of the time about social equality, because, in the objective analyses of the human physiognomy, all people are equal. The cultural and emotional differences between people were forgotten and with these also the historically-conditioned differences that made some social groups more privileged than others. Just as every atom has its meaningful place in a composite structure, the objective analyses led to all people being considered equal (Damgård-Sørensen, 1999).

The homogenous therefore became a quality in itself, and this was realised architecturally through the development of a forming principle –

7 They used the familiar demand analyses, in which objective measurements of the human anatomy (seating height, working height, reach, eye level, etc.) were used as the foundation for the architectural design.

'the principle of equality' (Bech-Danielsen, 2004). This meant that no homes were to be given any special qualities above others. This is evident in the end-wall flats of industrialised developments, where the special possibilities of having extra windows or balconies in the end wall have not been exploited. Similarly, the possibilities for designing the top-floor flats as penthouse flats or for giving ground-floor flats direct access to the outside facilities were rarely exploited. Everyone was to have access to the same qualities – no one was to have less, and no one was to have more than others.

Figure 3
'The principle of equality' was manifested in the buildings of the 1960s and 1970s. Homes were developed as standard types; a single standard type flat could be repeated again and again. The possibilities for adding special qualities to end-wall flats in the form of windows or balconies were not exploited. Similarly, the possibilities for designing the top-floor flats as penthouse flats with special qualities were rarely exploited. Photo: Claus Bech-Danielsen.

Criticism about of industrialised construction of the postwar era

Much of the criticism of the housing developments of the postwar era has been rooted in constructional aspects and in the durability of the materials used. For example, the flat roofs that were a permanent component of the architectural idiom of industrialised construction have been criticised for their tendency to leak. The flat roofs were inspired from Mediterranean architecture, but leaking roofs soon testified to the fact that the building customs of the Mediterranean did not translate well into Danish conditions. Large sums were spent sealing the roof surfaces.

Concrete damage was another recurring problem. The concrete of that time was poor in quality, and because the reinforcement was often placed too close to the edge, damage occurred to facades and end walls. Because the untreated concrete also became discoloured by algae growth and impurities in the air, eventually the concrete became a symbol of buildings where systematisation and efficiency were at the expense of the residents' desire for colour and variation.

The problems with leaking roofs and cracks in the concrete fall within

the traditional understanding of tectonics; however the problems with algae growth and colourless architecture are more closely linked to the understanding of everyday tectonics outlined above. Entirely decisive for this part of the criticism is the fact that criteria against which the developments were assessed were undergoing change. A number of societal and cultural changes occurred that led to new norms and new values. Fairly quickly after the construction of the industrialised developments, society moved from a class society to being a more individualised society. Individuals felt an increasing need to manifest themselves and their individual identity rather than their affiliation with a specific social class. This contributed to the homogenous and uniform facades of system building (which had been built on the basis of the 'principle of equality' as a positive expression of social equality) suddenly being perceived as a constraining framework, making it difficult for the individual to be heard. The original ideals of equality were replaced by ideals of diversity.

Against this backdrop, the industrialised construction did not look good. In a time when residents were striving to be unique, the long rows of mass-produced housing were no longer the ideal and criticism started to rain down on the developments. Criticism came from two sides. The postmodernists, including the pioneering Robert Venturi, represented one of the sides. Venturi (1966) criticised modernism for its simplifying way of thinking. Rephrasing Mies van der Rohe's 'less is more' to 'less is a bore' (Ibid.), he criticised the postwar era's rational building designs and claimed that mass-produced architecture had become uniform monotony.

The other side was represented by architects, such as Christian Norberg-Schulz, who was inspired by phenomenology. Norberg-Schulz (1979) criticised, in particular, the 'loss of place' which he believed the postwar buildings were responsible for. He believed that industrial construction was based on universal thinking, and he believed that all places therefore now looked more or less the same. Architecture was in the process of losing its 'sense of place' which, according to Norberg-Schulz, is vital to the formation of human identity (Ibid.).

Regardless of their different views of architecture, there is a kinship between Venturi's and Norberg-Schulz's criticism. Both believed that the industrialised construction of the postwar era was developed with a partiality for the abstract and the universal. For example, this was obvious in the way the architects viewed the users of architecture in the demand analyses mentioned above, which focused on the universal needs of man. The individual was disregarded, as were the differences that differentiate people. This endeavour to develop construction in the form of mass production and prefabrication expresses a goal that is abstract/universal in nature. Architects were not supposed to solve the housing problem in a single, specific place; they were to develop a concept that could solve universal housing problems everywhere.

With its rational way of thinking, architecture distanced itself from its concrete vantage point and was caught in absolute abstraction far away from the everyday experience of the industrialised buildings' target group: the general public. The German sociologist Jürgen Habermas pointed to this problem in a paper, in which he stressed the difference between lifeworld and system (Habermas, 1982). In the modernistic concept of architecture, emphasis is on developing the functionality, however, there is a great difference between the functional in a concrete lifeworld and in an abstract system. In the lifeworld, the functional refers to things meeting specific demands in everyday life, whereas in the system the functional is about meeting more abstract goals such as financial functionality.

According to Habermas, the buildings of the postwar era focused on the functional in an abstract system, and this led to a loss of the original intentions in modernism to place sensed experience, and the ability of the individual to shape and create, on an equal footing with logic (Ibid.).

In continuation of the critique previously stated, the material and technical side of architecture has increasingly come to serve its own purposes rather than addressing architectural problems of a spatial and historical nature (Hartoonian, 1994, p. 29; Beim, 2004, p. 46). In a one-sided system, structural designs are dictated solely by rational arguments and the users' individual needs are therefore neglected, as are their sensed experience and the artistic aspects of architecture. Buildings are reduced to a mere technical/financial matter.

Figure 4
Buildings built along crane tracks. According to Jürgen Habermas, these are buildings developed with focus on an abstract system rather than on a concrete lifeworld.
Photo: Claus Bech-Danielsen.

Renovation and renewal of postwar housing developments

Almost all Danish social housing developments from 1960 to 1979 have undergone renovation several times since their original completion. This renovation has been carried out over a period of almost 30 years, and opinions about social housing developments have changed significantly underway. Consequently, there have been shifting strategies for the renovation projects, and these projects have had different architectural goals.[8] In the following three strategies are described. The first two strategies both spring from a critical approach to the architecture of industrialised construction. Both of these strategies therefore built on an architectural objective to break away from the original architecture of the buildings. However, a tectonic analysis reveals that the strategies set about doing this in very different ways. The third strategy is inclined to accept the architecture of industrialised construction, which it understands as the architectural expression of the Danish welfare society. This strategy sees the postwar buildings as a part of Danish cultural history, and the objective of the strategy is therefore to realise the architectural potentials of these buildings.

Strategy 1) The postmodern response – stylistic changes without tectonic consequences

The first wave of renovations of the postwar housing developments took place during the late 1980s. The background was constructional problems but since opinion about the architecture of industrialised construction and about planning at that time was strongly critical, the renovation projects were often associated with a desire to change the architectural expression of the buildings.

The critique of the industrialised construction was primarily directed at the grey concrete and the repetitive nature of the architecture. The developments were lambasted for being 'monotonous' and 'drab', and postmodernism came to play a part in the architectural changes made in the renovation projects. The postmodernist idiom did not have much influence elsewhere in building and construction in Denmark during this time, however postmodernisms' joy in colour and its rediscovery of ornamental effects were very welcome responses to the 'grey and monotonous' expression of the postwar buildings. Therefore, a strategy was developed to conceal the grey concrete behind a colourful veil of facade covering. With different colours, the objective of the renovations was to respond to the change in norms that came when the ideal of equality was replaced by an interest in diversity and as the good life became increasingly associated with respecting the differences of the residents.

8 The subsequent description of the different architectural strategies is inspired from the analysis by the German researcher Vera Vincenzotti. Vincenzotti points out that different opinions about the suburbs can be identified in the professionals that work on developing the suburbs. She describes two trends: those who oppose and those who choose a qualifying approach. While those who oppose see the suburbs and their housing developments as a failure, those who choose a qualifying approach accept the developments in the suburbs as a reality to be developed further (Vincenzotti, 2008; 2011).

Figure 5
Postmodern design ideals were expressed with the renovation projects of the 1980s and 1990s. Here an example from Rønnebærparken in Roskilde. The architects responsible for renovating the housing development in 1990–1992 said: «We want to apply the 'classical' architectural elements in a new design» (Bech-Danielsen and Varming, 1997, p. 91). Photo: Claus Bech-Danielsen.

The strategy was to alter the architectural expression of the development by adding ornamental details to the buildings. Postmodern ornamentation, pastel-coloured pillars and curved ornaments above entrance doors characterised many of the renovation projects of that time. However, the influence of postmodernism in Danish architecture was short-lived, and criticism of the coloured renovations was prompt and merciless. Critical architects dubbed the renovated developments with nicknames such as 'Mexican cookie tins' and 'fairy lights' (Knudsen, 2013). Furthermore, a research report from the 1990s criticised the architectural strategy for having turned what was before 'exceedingly dull' buildings into 'exceedingly gay' ones (Bech-Danielsen and Varming, 1997). A result which, according to Michael Varming from the Danish Building Research Institute, was no less dull in the long run (Ibid.).

An analysis of the renovation projects confirms that the attempt to alter the architectural expression of the buildings was by merely changing the 'architectural style' of the buildings without more fundamentally addressing their tectonics and structure. For example, this is evident in the renovation that was carried out on the Ådalen housing development in the 1990s (see figure 6). The facades were re-insulated and dressed with Steni facade coverings and new and more striking entrances were added, along with patches of colour on the facades and artworks on the end walls. Thus the strategy attempted to break with the monotonous architecture of the 1970s by introducing colour and stylistic elements, while leaving the fundamental structure of the buildings unchanged: The colour scheme and the choice of materials was drastically changed, however the horizontal window bands and the overall rhythm of the facade were preserved. New materials were introduced but they were subordinated to the original tectonic expression of the building.

The renovation projects that were carried out in continuation of this strategy were therefore criticised for being 'pasted on' and 'superficial';

i.e. postmodernism par excellence. The renovation projects responded to the critique that the 'architecture of equality' failed to align with the differentiated and varied everyday life of an ever more individualised society. However, they did this without changing the fundamental tectonics of the buildings. The result was a superficial image of multi-coloured diversity mounted on a tectonic frame telling the story of the principle of equality. Without tectonic consequences, an image was created of a diverse and varied life.

Figure 6
Ådalen in Struer after it was renovated in the early 1990s. The original facades have been hidden behind Steni coverings; colours have been added around entrances, and artworks adorn the end walls. Despite these ornamental effects, the rhythm and horizontal structure of the buildings have been preserved.
Photo: Claus Bech-Danielsen.

Strategy 2) The radical response – stylistic and tectonic changes

Despite the fact that the postwar housing developments were constructed with poor materials, renovation projects often used materials that were even poorer in quality (Bech-Danielsen and Varming, 1997). Therefore, the buildings soon needed to be renovated anew, and it was a lesson learned that using poor materials to save money is both expensive and cumbersome in the long run.

Consequently, in the early 2000s, a series of renovation projects were completed, in which the light facade coverings were replaced by bricks. This led to new renovation solutions, however the critical attitude towards the original architecture of the buildings remained the same. For example, this was the case when Vejleåparken was renovated in 2004-2008. With a facing wall, the raw concrete of the buildings was hidden away behind traditional materials and the characteristically modernistic, horizontal window bands were disguised. Ornamentation by various artists around entrances in facades further helped to blur the modernistic architecture of the buildings. For example, using different types of brick, various artists created organic patterns on the new wall surfaces, thus establishing a counter-image to the building's original cubic shapes. Elsewhere, the ornamentation of the facades was achieved by having some of the bricks protrude from the surface of the brickwork, creating classical-style relief patterns. Traditional brickwork, ornamentation,

organic shapes and classical style; i.e. all of the elements that were banned from the industrial architecture of the postwar era were brought into play once again. The architectural expression of the industrialised construction was dismissed, erased and removed.

Figure 7
At the Vejleåparken housing development, the original idiom of industrialisation has been erased. The photo illustrates the artistic work on the entrance facades. The organic shapes create a contrast with the original cubic expression of the building.
Photo: Claus Bech-Danielsen.

Figure 8
The balcony facades at Vejleåparken before (top) and after renovation (bottom). Photo: Claus Bech-Danielsen.

However, in the case of Vejleåparken, ornamental effects and stylistic changes were not the only elements in the renovation project. Because of the introduction of bricks, this project also introduced new tectonic principles. New structural principles formed the basis for adding the facing walls. As a result the architecture of the building is radically changed; both stylistically and tectonically.

However, the original facades entail a number of architectural restrictions, which make it difficult to comply with the tectonics of brickwork. For example, this meant that the new facing walls had to be subordinated to the rhythms of the windows in the facade, and the brickwork was therefore put into play because of the tectonics and structure of the concrete. This has contributed to weakening the architectural strength of the new facades, as it is difficult to introduce entirely new design principles on an existing building.

Let us delve a little deeper into this issue. It is, of course, possible to

break away from the architectural concept and the planning concept of industrialised construction, and in some cases the assessment may be that breaking away is required. However, one must be aware that this is an extensive and, at times, very resource-demanding strategy.

For the purpose of illustration, let us look at another extensive renovation project, which took place in 2004–2007 in the Bispehaven housing development in Aarhus. The original balcony facades had balconies set deep in the building, with dominant vertical partitions between the individual flat, and the heavy horizontal concrete parapets stood in contrast to the light wind sections of the flat. The renovation project altered this expression dramatically. The entire facade was enclosed with glazing and the original expression of the building was erased. The depth and structure of the facades disappeared, and along with them the play of light and shadow, the contrast between heavy and light building components, as well as the variation of horizontal and vertical lines.

Figure 9
The balcony facades of Bispehaven before and after renovation. The basic architectural qualities of the building are hidden away, and new ones therefore have to be established.
Photo: Claus Bech-Danielsen.

The basic architectural qualities of the buildings were thus hidden away, and the new glass facades appeared as a one-dimensional imprint of the original facades, although without similar consideration for the dimensioning of the individual parts of the building. This suggests that a break with the original architecture of a building requires great architectural diligence. It is important to realise that existing qualities will be lost when the basic architectural idea of a building – its forming principle – is dismissed. Therefore, it is necessary to create new, genuine qualities to replace the original qualities.

Establishing new qualities can be difficult. The architectural qualities of a building are developed on the basis of a principal architectural idea pervading the building at all levels. The idea functions as a forming principle which governs the tectonic and structural construction of the building, and which all the parts of the building subsequently support. Therefore, if new elements based on another architectural idea are introduced, the existing structures will not necessarily support the new design. At worst, things will work against each other, and it may be difficult to create a convincing architectural entirety.

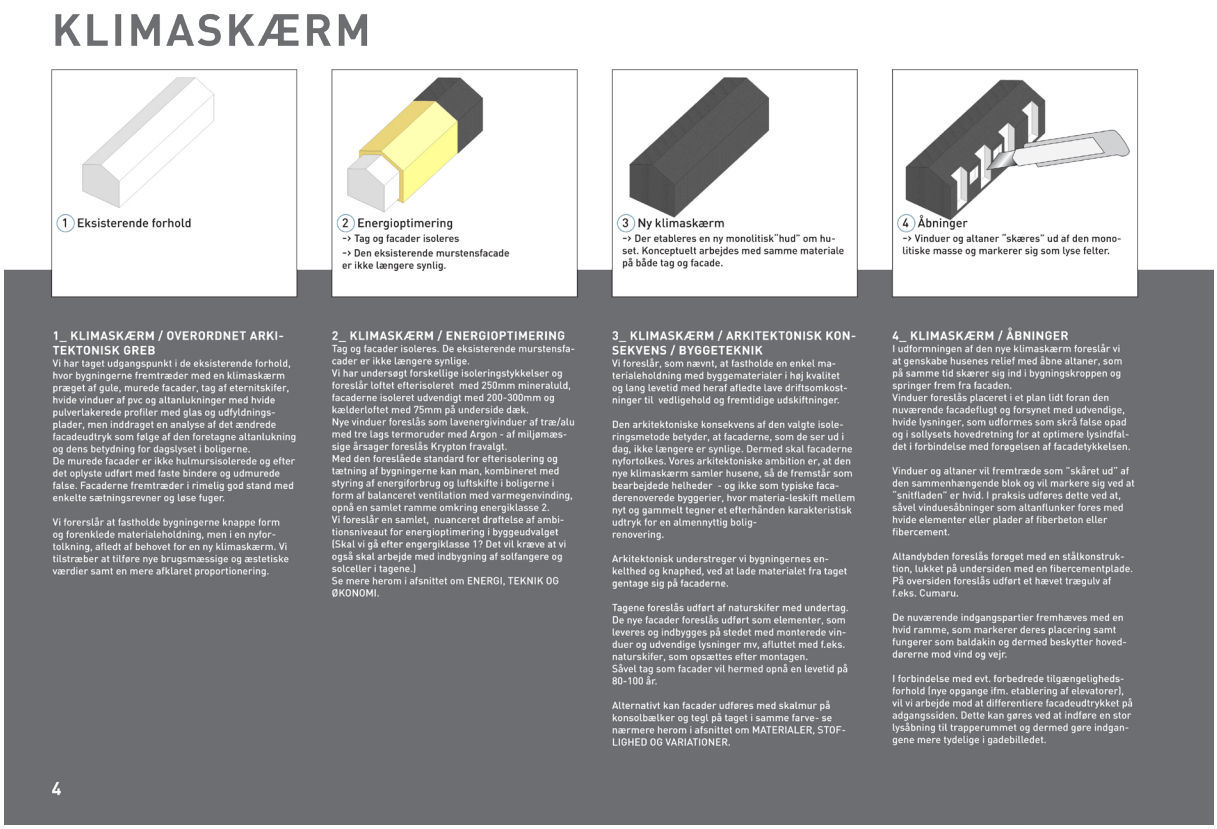

Figure 10
This is an example of architects' deliberate attempt to establish a new architectural idea. With the proposal for extensive climate renovation at the Stadionkvarteret housing development in Glostrup, the existing architecture was packed away. A new architectural principle was introduced with a simple solution. The result is a building with a new and distinctive architectural expression. JNV Arkitekter.

Strategy 3) The qualifying approach – establishing basic architectural improvements on the basis of existing tectonics

The third strategy does not represent an intention to reject the architecture of industrialised construction of the postwar era. This strategy takes its point of departure from the original architecture of housing developments, which here is considered part of the cultural heritage of the welfare society. However, the strategy takes into account that times have changed and that there are new demands on the buildings, which therefore must be adapted and changed. This is done not by erasing the postwar architectural footprints, but by preserving them, adjusting them, and adding new qualities to them.

This strategy for renovation of social housing was already apparent in the mid–1990s (Bech-Danielsen, et al., 2014), and it has seen a revival in recent years. This revival has been nourished by international examples, in which trendsetting architects have insisted on preserving existing structures and qualities in connection with renovation of postwar buildings (Ruby and Ruby, 2007). These architects include Frederic Drout and Lacaton & Vasal with their renovation of Tour Bois le Prêtre in Paris. This building was deemed to be without architectural values, but in an architecture competition, the three architects insisted that the building had potential (Ibid.). They stripped the facades of the building, and encircled it by a three-meter-deep extension with space for large balconies and new sun lounges for all the homes in the building.

With the new shell, the renovation resembles those that 'opponents' of industrialised construction have been responsible for. However, the view of the original architecture is different in the Parisian project, which does not reject that industrialised construction of the 1960s can hold qualities, but instead insists on searching for their potentials. It is all about seeing the potential, developing existing qualities and supplementing them with new. The primary challenge is not to change the architectural expression on the facade, but to create basic architectural qualities (spatial relationships, improved daylight conditions, attractive views etc.) for the residents in the building.

In recent years, several renovation projects of similar 'qualifying' character have taken place in Denmark. An example is the renovation of the Gyldenrisparken housing development in south-east Copenhagen. This renovation began with an architecture competition won by Tegnestuen Vandkunsten and Witraz Architects in 2005. The buildings had to be renovated because of damage to the concrete, but despite re-insulation of facades and end walls as well as new fibre-concrete elements, the development has kept its original character. The architects have built further the original architecture of the buildings; the tectonic structure of the buildings was used as a basis for the work, which was about adding elements that create new functional and aesthetic qualities.

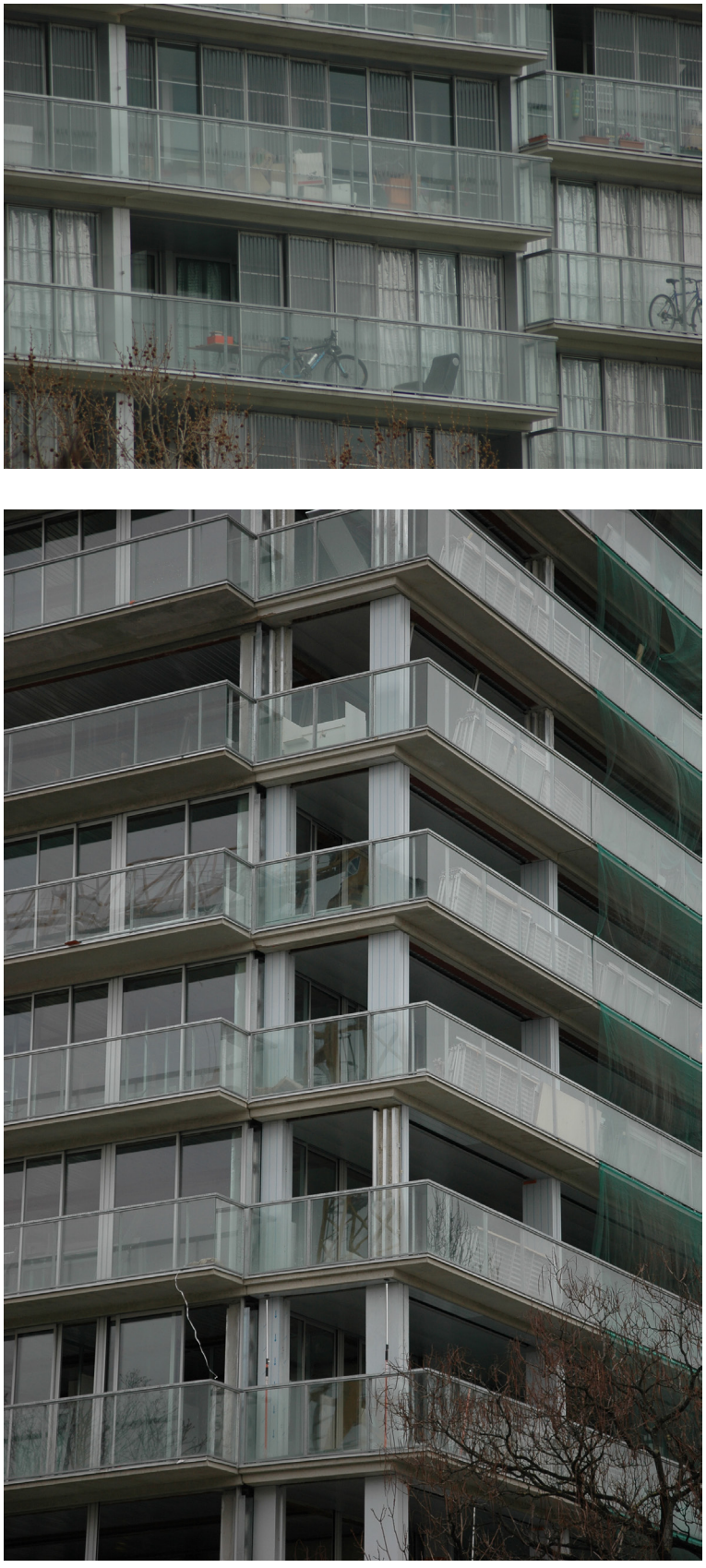

Figure 11
Tour Bois le Prêtre in Paris, renovated by Frederic Drout and Lacaton & Vasal. Photo: Claus Bech-Danielsen.

The renovation of Gyldenrisparken was not about cosmetic alterations and changes in the architectural style to erase and change the original appearance of the buildings. Nor was it about adding materials requiring the introduction of completely new tectonic principles. An example of this is the balcony facades. They were extended so they became more useful. Moreover, the parapets were designed in opal glass and the glass panels of the facade were extended to improve daylight in the buildings considerably. However, the original proportions as well as the original structure and depth of the balcony facades were kept, and the contrasts between light and shadow as well as between heavy and light building components were preserved. The basic qualities of the buildings were improved using the original architecture (its style and tectonic qualities). These qualities are fundamental and of a both functional and aesthetic nature. They will have a long-term effect and they will influence the everyday life of the residents.

Figure 12
Gyldenrisparken after the renovation. The new balcony facades build on the original tectonic qualities, but at the same time the balconies have been extended, so their utility value has improved significantly.
Photo: Tegnestuen Vandkunsten.

Figure 13
In connection with the renovation of Gyldenrisparken, new bay windows were installed in the kitchens. This greatly improved the view and daylight.
Photo: Tegnestuen Vandkunsten.

Figure 14
The facades in Gyldenrisparken were re-insulated and covered behind new fibre-concrete elements. They build on the original tectonics of the buildings, but creamy colouring and new profiling add new textural qualities and experiences to the buildings.
Photo: Tegnestuen Vandkunsten.

Discussion and conclusion – 'reuse' in architecture

As described in this paper, different architectural assessments can form the basis for renovation of social housing. This may lead to different strategies; some architects aim to change the architectural expression of the buildings, whereas others put a lot of effort into finding the potentials of the buildings and building on the existing qualities of the buildings. Some architects build further on the original tectonics of the buildings, whereas others more or less deliberately break away from them.

It is not possible to recommend which strategy leads to the best results on the basis of the few cases in this paper. However, it is possible to ascertain that many fine results have been achieved in a number of buildings which have been renovated through a 'qualifying approach' over the past years, and this has received great attention from architects and architecture critics. This is not least relevant for the renovation of Gyldenrisparken, which was nominated for the Mies van der Rohe Award in 2012. This demonstrated that it is possible to create excellent archi-

tectural results by 'reusing' the original architecture of industrialised construction.

Perhaps reuse is not only about environmental sustainability when postwar suburban buildings are to be renovated. Reusing identity can be important as well: Over the past decades, many suburban residential areas have developed a self-perception and numerous identity-forming stories that are important for the experience of the areas. Therefore, starting all over again (establishing a tabula rasa) can be problematic, as was the case when postwar buildings were originally built.

When architects on the 'qualifying team' talk about reusing original structures and qualities, this not only applies the reuse of physical resources. These architects insist on discovering the little stories and unique characteristics that have developed over time. They reject any notion of resetting history anew (Ruby and Ruby, 2007), and develop strategies which enable new interpretations of the buildings' structural and spatial relationships as well as development of new meanings which settle like layers on top of the existing layers.

This may be of particular importance for the development of the housing developments of the suburbs. A crucial problem of the suburbs is that they are one-dimensional. As opposed to traditional cities, which developed layer-upon-layer in the same place, i.e. vertically, the suburbs developed layer-upon-layer at an ever greater distance from the original core of the city, i.e. horizontally. This means that the city and its buildings, in which stories of changing times lie as archaeological layers on top of each other, are perceived as a patchwork rug of lived life and changing perceptions of the city, its buildings and residents. Therefore, the suburbs and suburban residential areas, in which planning ideals of changing decades lie side by side without interfering with each other, are still perceived in their 'pure' form. Consequently, if suburbs are to be developed into characterful residential areas with each their identity, it is important to preserve the traces of the past when developing the individual areas.

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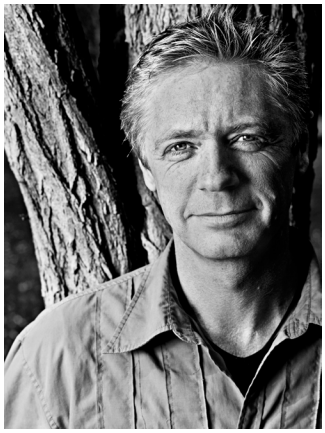

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