Bernard Olsthoorn

Form & Modelling Studies
Faculty of Architecture
Delft University of Technology
Delft, the Netherlands

Two Graduation Projects, Nine Brief Sketches

Keywords
Design research modelling; design strategy; representation and presentation; exploration and communication; insight and evocation.

Abstract
The paper “Two graduation projects, nine brief sketches” examines the manner in which two alumni of the Faculty of Architecture of Delft University of Technology used models in different design stages of their final project. Rolf Backelandt graduated in 2005. His project, the design of a Rietveld Information Centre, is located in the immediate vicinity of the Rietveld Schröder House in the city of Utrecht. Theo de Leeuw graduated in 2003 with the design of a large cinema complex in the city of Leiden. The projects were chosen because the nature of the design assignment, as well as the context and implementation of their respective designs, differs greatly. Whilst Backelandt’s design is subdued and relatively modest in terms of size, De Leeuw’s design is characterised by its impressive scale and monumental presence. In addition, Backelandt’s method is analytical in nature, driven by the question ‘why’, whereas De Leeuw’s method is in some respects more straightforward and motivated rather by the practical question ‘how’. Yet at the same time, there exists a strong similarity between the two graduates, a similarity determined by a common design strategy. From the outset, both utilised the model as a steering medium for research and imagination throughout all the stages of the design process. The result of their chosen design strategy and their quest is described in the nine brief sketches below.

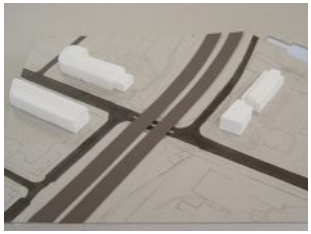
Presentation model by Rolf Backelandt

Exploration model by Theo de Leeuw

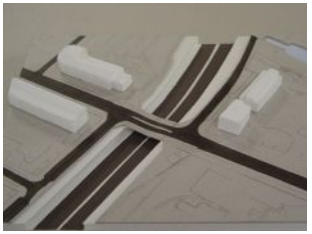
Remodelling the context: a survey.
The idea behind Backelandt’s final project was to have the Rietveld Information Centre located in the immediate vicinity of what was a famous spatial experiment by Rietveld. The question, however, was where exactly it should be. The Rietveld Schröder House is almost literally hemmed in by a dike embankment along which a highway runs, and the building against which it is constructed. Not surprisingly, Backelandt’s main problem was how and where to create the space for a building. Moreover, the task was related to the hypothesis that it would be possible to restore – in as far

as possible – the original, spatial relationship between the Rietveld Schröder House and the two apartment buildings on the Erasmus Lane both designed by Rietveld. The quest for potential solutions to this particularly difficult problem and the underpinning of the hypothesis were conducted using a simple yet effective urban planning research model on a scale of 1:500. Radical reduction typifies this model. The research model was limited to a 3D representation of the most important entities at the site, namely the three buildings by Rietveld and the dike embankment of the highway. A fifth 3D element was added in order to visualise the space of the street in which the Rietveld Schröder House is located. The representation of the other urban planning allotments was restricted to a drawing on the base plate of the research model. This extreme reduction contributed to the fact that the comparison of the four scenarios examined using the model could be properly assessed in terms of their potential efficacy.

Scenario 1 examined what the spatial implications would be if the highway were to be brought down to ground level. Although this would partially restore the spatial relationship between the Rietveld buildings, it would not yield any practical benefits in terms of space.



Scenario 1.



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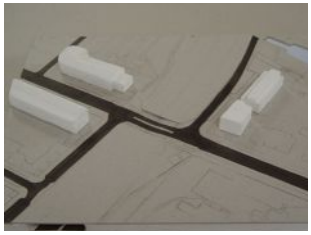

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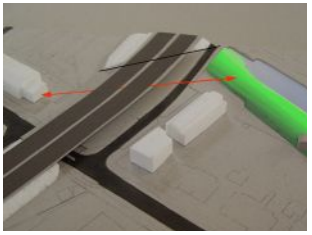


Scenario 4.

Scenario 2 examined what the outcome would be if the highway were to be lowered to below ground level. This would also partially restore the relationship between the Rietveld buildings, yet would again fail to yield any practical benefits in terms of space.

Scenario 3 envisioned the highway being constructed entirely underground. This radical solution would create the space necessary for the information centre and would also completely restore both the relationship between the Rietveld buildings and the continuity of the urban space. This alternative was rejected due to its enormous implementation costs.

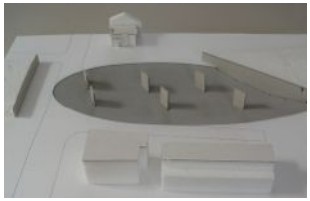
In scenario 4, Backelandt came up with a surprising intervention. He decided to accept the status quo to a certain extent but to have a large proportion of the core of the dike underneath the highway removed. The intervention would give rise to an open space below the highway of sufficient size so as to help shape the architectural task. In addition, in this new context the relationship between the three Rietveld buildings would be restored. This proved the viability of his hypothesis. Finally, the intervention ensured that an artefact from the dike embankment of the New Dutch Waterline , completed in 1870, could be included in the scenography of the planning.

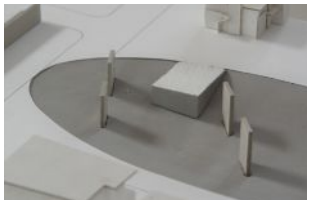
Modelling the conceptual design themes.

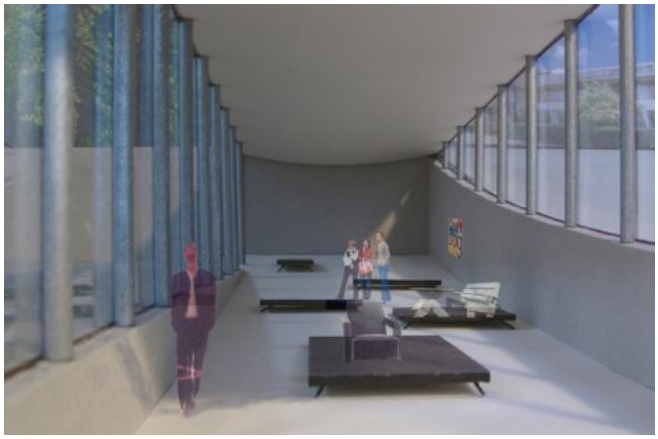
The conceptual themes are aimed at restoring the spatial relationship between the three Rietveld buildings, at developing an ‘architectural landscape’ within the new situation and at bringing about a relationship between the design and the artefact of the New Dutch Waterline.

A problem related to the chosen scenario was that the highway was supported by the mass of the dike embankment. Taking away a segment of the core of the dike required the highway to be supported by a specially built construction. In order to ensure optimum natural light underneath the resulting overpass, it was also decided to split the road surface in two and to separate the sections by a substantial distance. Calculations pointed out that each section of the road surface needed to be supported in three places. After testing several alternative designs, a solution was chosen in which six simple yet huge concrete slabs were placed in a fan-shaped pattern. These slabs define the spatial image of the site and consequently delivered the context within which the Rietveld Information Centre would be designed.

Yet another problem related to the chosen alternative was the limited height of the area opened up below the highway.





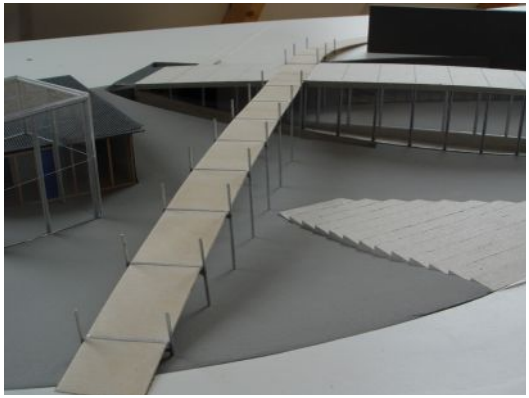


There would be barely sufficient space for one floor. The option of building completely underground was quickly abandoned, because doing so would reduce the design task to a largely interior-design assignment.

A solution for the height issue was sought in a series of research models on a 1:200 scale. The model presenting the solution demonstrates the selected choice to have the spatial volumes lowered into the ground until their upper surfaces. This may seem like the underground building alternative, but as a result of the concave curvature of the ellipsoid surface, all spatial volumes within it are freed up again. This design decision ensured that the view from and of the Rietveld buildings would be protected. Several investigations dealing with composition were carried out using a study model. The model on a scale of 1:200, in which the final grouping of the design components was laid down, shows how these components anticipate the fan-shaped placement of the concrete slabs. The razor-sharp wall that closes the dike embankment of the highway, powerfully rounds off the spatial scenography of the placement of the concrete slabs. Seen from within the Rietveld Schröder House, the gaze of the viewer will be led, via the concrete slabs, along the two Rietveld projects. Finally, the razor-sharp wall draws eyes to the artefact of the New Dutch Waterline.
The light conditions within the volumes were tested and measured using research models on a 1:50 scale. The study models proved to be highly effective also in drawing up an inventory of any constructional issues and aspects of detailing. Thanks to this integrated design method, the design was fleshed out to a high quality at all scaling levels.

The representation and presentation model.
The aspect of ‘seduction’ plays a significant role in the transfer process to client and user. An adequate presentation model sparks viewers’ imaginations and enables them to form a mental picture of the architectural reality yet to take shape. In order to be effective, the presentation model must be easily ‘legible’ and provide room for interpretation. This encourages the viewer to look with eyes of a designer. Consequently, this will give rise to interaction between architect, client and user. The ensuing engagement helps client and user to become partners in the design process. The importance of this should not be underestimated. But even after interaction and engagement have helped to transpose the presentation model into a tangible and functioning building, in a way, it is still no more than a semi-finished product. After all, it is the user or viewer who attaches meaning to it and who once again forms a mental picture of the implemented design. Only then, one might argue, is the design fully completed.

The nature of the presentation model of the Rietveld Information Centre design on a scale of 1:100 is twofold. On the one hand, we can speak of a far-reaching abstraction in the tranquil representation of the surroundings, especially insofar as the representation of the three Rietveld buildings is concerned. Despite the fact that this radical reduction of visual information completely lacks detail, the visual imagery of the essential architectural characteristics of Rietveld’s buildings is accurate and precise. The presentation of the design, however, is of a much more forthright nature. Precisely because of this difference in expression, attention is directed first and foremost to the design, without becoming oblivious to the newly shaped context. The constituent parts of the Rietveld Information Centre (the entrance hall, the main office area with reception desk, the exhibition area, the archive area, the corridor connecting the three previously mentioned areas and the three pedestrian bridges envisioned in the



design) are all materialised differently. Even though the material contrasts are greater on a scale of 1:1, the scaled down representation of these contrasts in the presentation model is perfectly balanced, with a proper sense of nuance. By applying a single tone of colour to the concavely curved ellipsoid of the basement and the highway, a powerful unity of imagery is achieved in the representation and presentation model.
The model as a whole is persuasive and evocative. This is partly achieved by having the well balanced scheme of colour tones in the design contrasting sharply with the surroundings, represented in a calm white. Together with the fact that the design is subtly placed away from the centre of the ground surface, this contrast tends to evoke the image of a presentation being depicted on a pristine canvas by a painter with a single, powerful stroke of the brush.

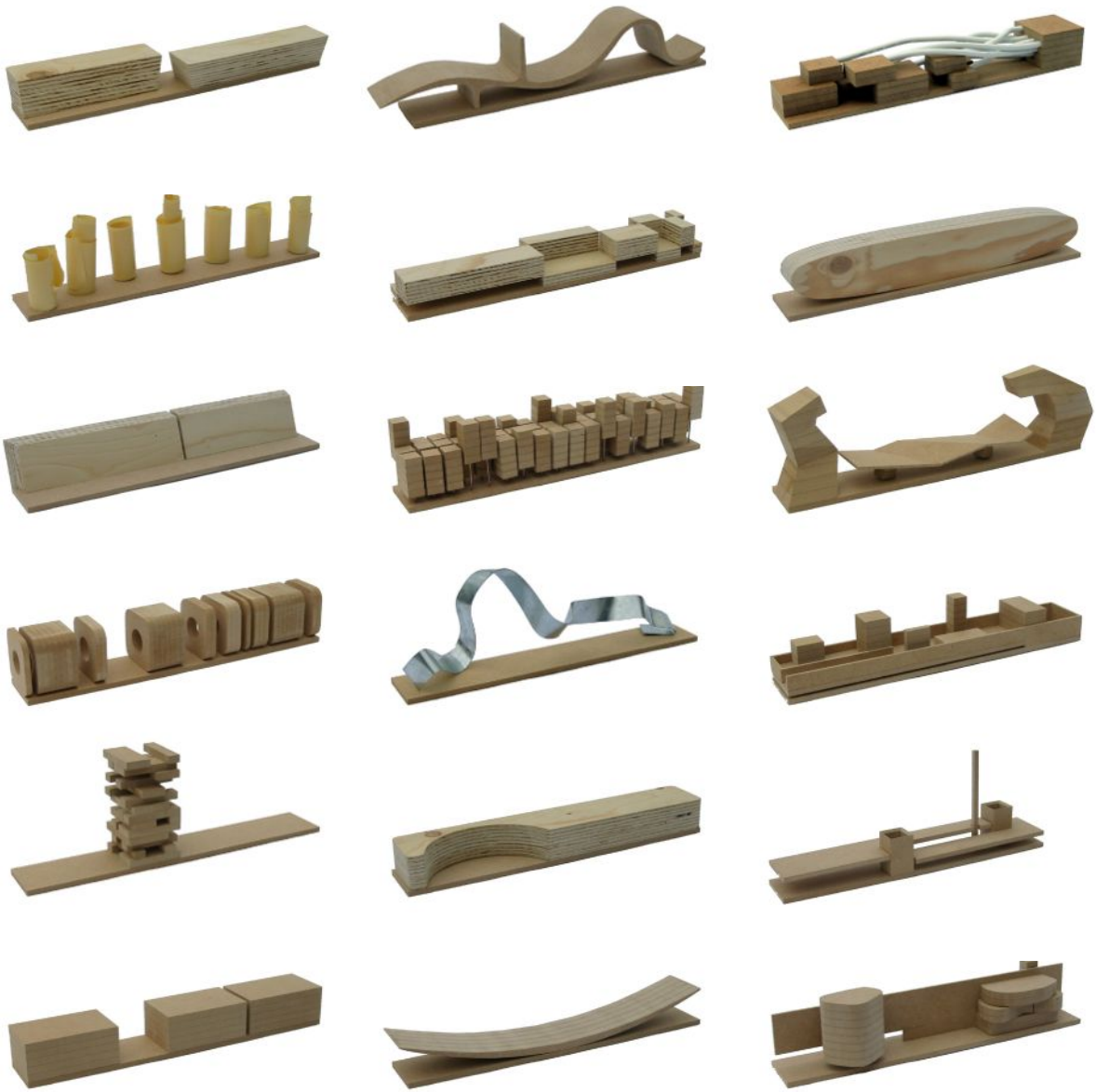
The model as a method for comparison.
The central design hypothesis in Backelandt's final project is that restoring the spatial and visual relationship between the Rietveld buildings is both desirable and possible. He developed four alternative scenarios to underpin his assumption. The alternatives were tested using an urban planning research model and underwent a critical-analytical mutual comparison. Subsequently, he evaluated the outcome of the analysis against the research question. In the transfer process and in communication with the client, the outcomes of such research play a significant role in providing a foundation for the concept and in concretely demonstrating the viability of the idea.
During the transfer of the final design to the client and user it is important that the viewer is able to assess the result of the design intervention against the existing situation. The representation and presentation model made by Backelandt offer abundant opportunity to do so. The representation of all relevant entities, being the three Rietveld buildings, the artefact of the New Dutch Waterline and most of all the dike embankment of the highway are visualised convincingly and transparently. In other words, the representation and presentation model is aimed at producing a transparent visualisation of the current and future situation at the same time.
Photography was used alongside the representation and presentation model. It turned out to be an excellent medium for tightening up the verification of the design hypothesis. The photo, showing the Rietveld Schröder House together with the dike embankment of the highway, bears merciless witness to the current situation.

By taking photos of the model from the same angle as in the real situation, comparison and assessment were introduced into the transfer process. The comparison demonstrates clearly that the area is effectively opened up by the removal of the core of the dike. The photo taken from within the Rietveld Schröder House indicates how the dike embankment of the highway comes to a standstill at the boundaries of the Schröder House garden like a landslide. The photo of the representation and presentation model taken from the same angle immediately illustrates how the area opens itself up effectively, thereby freeing up the view of the other Rietveld buildings.

The efficacy and impact of the intervention could now be assessed objectively with the help of photography. The presentation as a whole offers interested viewers ample room for creating their own perceptions. The design provides the city of Utrecht and the Central Museum, that took over the management of the Rietveld Schröder House in 1987, with nothing less than a plausible reason to start a serious debate about rectifying the deplorable situation the three Rietveld buildings are now in.

The exploratory model.
Theo de Leeuw started his design for a large cinema complex in the city of Leiden with a series of eighteen exploratory models, which were part of his final project at the Faculty of Architecture of Delft University of Technology.
The site where the building would have to be raised, is along a railway line in the immediate vicinity of the station. In order to obtain a thorough understanding of the site, an urban planning model on a scale of 1:500 was made. The building structures represented in this model were built up in layers. Each layer corresponded in scale to the height of a floor. By doing this, the number of floors actually became countable. Therefore, the model generated unusually clear insight into the scale of the urban structure and the dimensions of the site. This effect is enhanced even further by keeping the façades out of the picture. A reduction such as this one creates a superbly transparent representation of both the appearance of the buildings surrounding the site and the urban space.

The eighteen exploratory models came about as the first step in finding an answer to the question of what the measurements, scale and the sculptural presence of the building at the site would have to be. A feature of the series is that no model whatsoever was influenced by either programmatic or functional preconceptions. Despite this, the significance of the series of exploratory models was in fact expressed in the phase in which a more precise definition of the conceptual principles became apparent.
The exploratory models on a 1:500 scale were assessed in the urban planning scale model against their evocative power. A critical, visual analysis was performed on each model and mutual comparison opened up pathways to a number of potential solutions. The visual analysis also made it possible to classify the models according to their type: the formal model, the organic model, the structuralist model, the constructivist model, the deconstructivist model, the systematic model, the sculptural model and the spatial organisation model.



The conceptual model.
The exploratory models should be regarded as an intuitive, breadthways probe. The subsequent typological classification of these models can be considered a more rational analysis. Taking this a step further, the value of each model was assessed against its potential evocative power at the site. Moreover, the models were evaluated based on the extent to which they could be used in functional terms. The conclusions drawn from this led to a drastic selection. Based on the outcome of this elimination strategy, a series of six conceptual models on a 1:200 scale was developed. The models were all given names: 'Bear', 'Bell glass', 'Web', 'Swiss Cheese', 'Static Cloth' and 'Dynamic Cloth'. Steering theme during the creation of these conceptual models was the idea to design a cinema building 'in which the rooms are embedded in an abundance of public spaces where one wanders about,' as formulated by De Leeuw.

The 'footprints' of the exploratory models can still be discerned in the conceptual models. Contrary to the breadthways probe as seen with the series of exploratory models though, the conceptual models serve as in-depth explorations. These are aimed at creating a general idea as to the criteria with which the design at hand should comply. The six conceptual models are an unrestrained expression of relatively intuitive thoughts. Even though the six models are not in any way a physical reality, they have nonetheless been worked out with a keen sense of scale. This enhances the testability of the models, which is even more so because they are placed on a strip that happens to correspond in scale to the dimensions of the planned site.
The tests led to the following conclusions.

1. Typical of the 'Bear' conceptual model is its concentration of form limited at one spot of the site.
2. 'Bell Glass', on the other hand, aims at a broader spread over the site.
3. 'Web' investigates a more complex method of layering and spatial penetration of various sculptural volumes than 'Bell Glass' does.
4. The nature of 'Swiss Cheese' is more sealed off and strictly geometric. At a number of strategic spots, volume has been removed from the basic form that is articulated along a rectangle. The principal form derived from this is a demure, rhythmical articulation and an inward bound plasticity.
5. 'Static Cloth' is a proposal in which an alternative form of 'Web' is enshrouded with a semi-transparent fabric that acts as a climatic divide.
6. 'Dynamic Cloth' is an answer to the static form of 'Static cloth'. The twisted shape is composed of a series of differently angled rafters placed next to each other at similar distances. The rafters would be spanned with PTFE foil, thus creating a space in which to place an alternative in form to 'Bell Glass'.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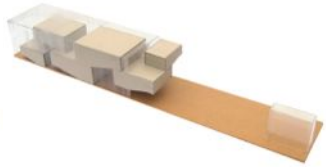
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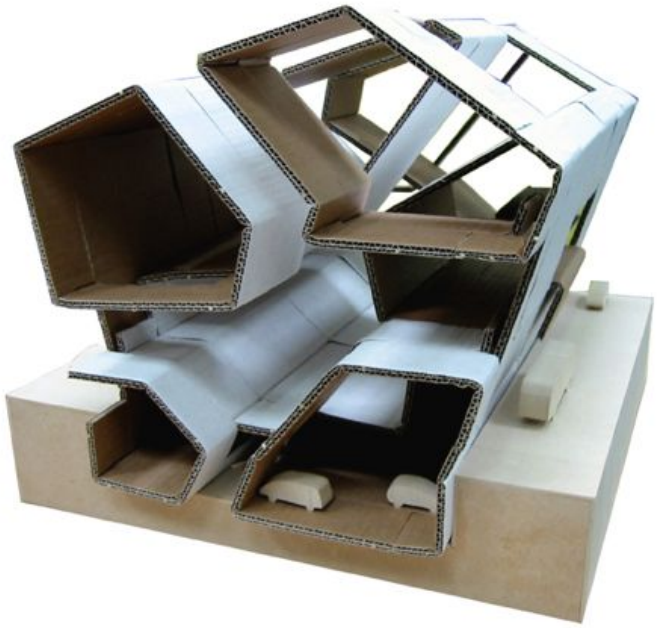

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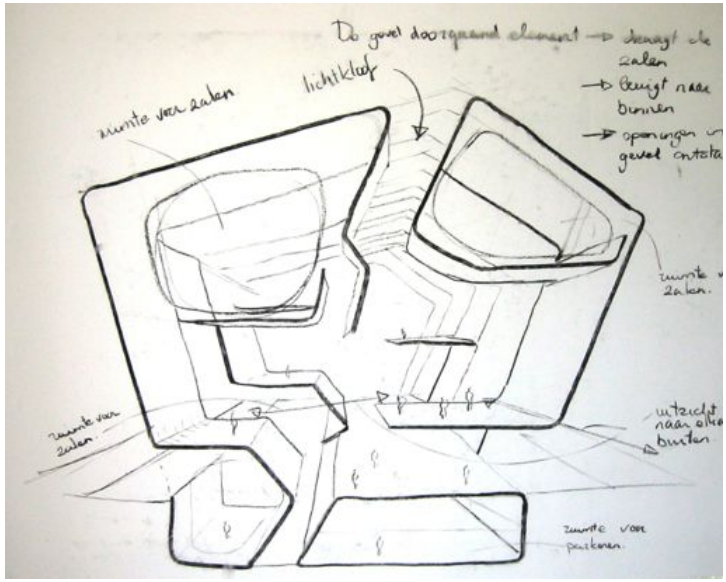
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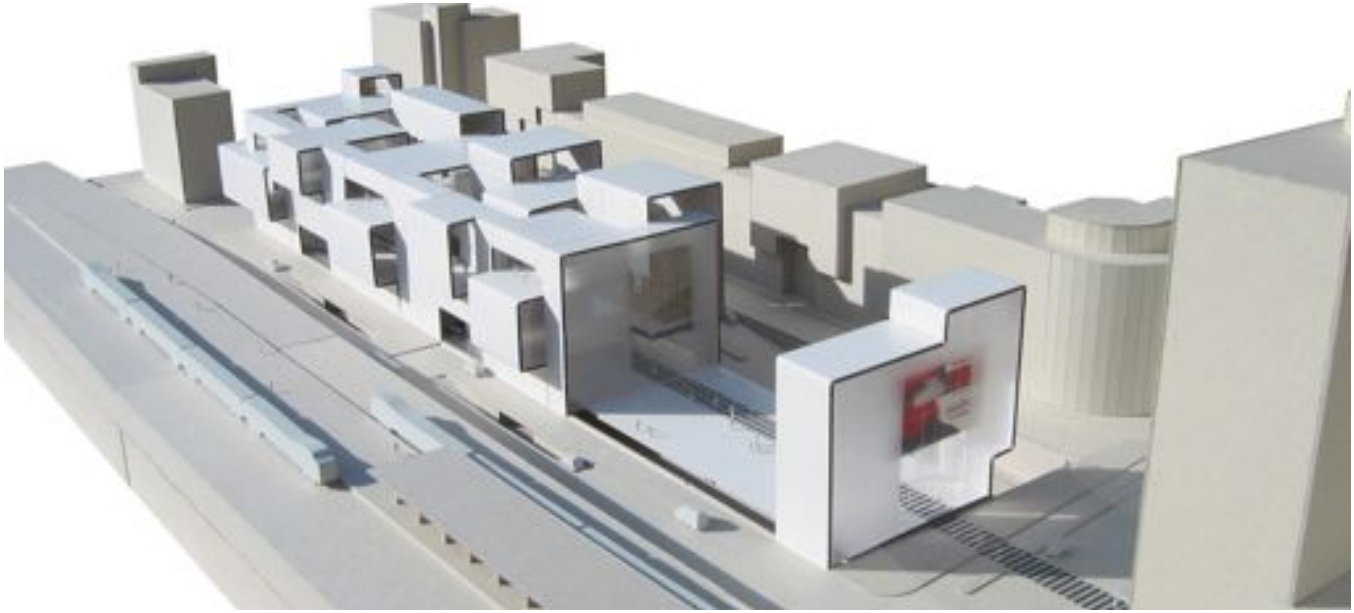
The constructional/construction testing model.
A synthesis between the ‘Bell Glass’ and ‘Dynamic Cloth’ concepts presented itself through a crucial drawing. The monumental layering and penetration of spatial volumes as seen in ‘Bell Glass’ and the breakthrough of the orthogonal order as examined in ‘Dynamic Cloth’, merged into a new alternative in this drawing.
Various study models of this alternative on a 1:200 scale quickly indicated the necessity of an inquiry into the complex constructional implications of the idea, if only to avoid ending up with a pie in the sky. In order to facilitate the study, De Leeuw took an excision of one of the study models and turned it into a constructional testing model on a 1:100 scale, using a type of cardboard that was white on one side and brown on the other. This choice of material offered the unintended benefit of having a transparent coding of the two major components of the concept. The cinemas, for instance, would be expressed in brown and the public spaces inside the building, in white.
Partly because of the applied scale, it was relatively easy to perform the stress and strain tests. The exerted physical stress demonstrated a surprisingly high level of rigidity in the testing model. Nevertheless, construction modifications were necessary. The transparency of the testing model made it possible to quickly detect and identify any issues, after which specific structural forces could be calculated.
The constructional/construction testing model offered an effective insight into the feasibility of the idea. The model was therefore used at a crucial time in the design process. At that particular moment, De Leeuw had to take reflective distance from the work already done. The ‘legible’ scale of 1:100 was very helpful in this respect, as was the surprising level of transparency provided by the structural testing model.

Additionally, this test model made a clear prefiguration of the potential spatial outcome on a 1:1 scale possible. This paved the way for a critical appraisal of the result. Consequently, the questions generated by this critical reflection resulted in modifications of the design.

The presentation model.
The final design was presented by means of two urban planning models. A 1:500 scale model in which the exploratory models were tested in the initial phase of the design process, and a 1:200 scale model made of grey cardboard in which the six conceptual models were also tested.
The urban planning model on a 1:500 scale is a substantial excision taken from the urban structure surrounding the site. The presentation model on a scale of 1:200 was made of grey cardboard and restricted to the immediate vicinity of the design, consisting of the railway line and the buildings facing the site. The final design made of thin, white cardboard, was placed into this. Using this simple material, the characteristic rounding of the corners of the spatial volumes could be easily expressed. By means of a reduced representation of the surroundings and by limiting the presentation of the design to the bare essentials, namely a rhythmic linking and penetration of spatial volumes, the message is conveyed in the blink of an eye. In conjunction, on closer examination the presentation model shows the scheme of relationships applied in organising the layout of the cinemas, foyers and ‘city balconies’. In accordance with an important conceptual principle of the designer, both of the latter elements form ‘an abundance of public spaces in which one wanders about’.
To further emphasise this principle, the design includes a square stretching out from the cinema complex to the ‘gatehouse’. This form element, demarcating the square in a striking fashion, contains the box office. It also serves as a huge billboard on which trailers can be screened. Various alternative forms of the gatehouse were examined using the presentation model. In other words, the model played an effective part in the search for the final design of the gatehouse. The gatehouse is crucial in the scenography of the urban fabric given that it is strategically placed along the extension of an important line of sight that links the site to the centre of the city.
The model encourages the viewer to ‘read’ the design in different ways, so as to fathom the design principles applied. One major design principle demanded the building be alternately open and closed, depending on the location and viewing direction of the viewer. If one observes the model all around at eye level, one can see this principle is very clearly expressed.

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The cross-section model.
The icing on the cake is a cross-section model. In fact, the model is a very refined synopsis of the design, made in high detail. It offers a transparent view of the building technology used, the details, the use of colour, the spatial impact of the escalators, and the materialisation and impact of the differences in level applied.

As the underground parking garage is included in the cross-section model, the total evolution of the structural mechanics becomes transparent. It shows how the forces of pressure are carried forward through the steel columns and walls of the ground floor down to the system of vertical and diagonal steel beams in the parking garage, where they will dissipate in the foundations. The working of this construction principle will never be observed in its entirety in the real world. The fact that the cross-section model shows the magic of structural mechanics in such a powerful way imbues the model with great educational value.
The model is of such precision and accuracy, that it lends itself perfectly to meticulous photographic scanning. Using this medium, the spatial composition of the interior was represented from several strategic positions. The sequence of photographic images resulted in an exhilarating virtual walk through the building. As a result, the audience present at the final presentation had no problem whatsoever in forming a mental picture of the building.

If the exploratory models, the conceptual models, the constructional/construction testing model, the presentation models and the cross-section model are observed as a cohesive set, the step-by-step development of the design process is fully unveiled. It is then revealed that the exploratory models during the initial stage of research contributed to the formulation of the early design-related assumptions, that the conceptual models led to a more concrete shaping of images, and, finally, that the testing of the results of this in the constructional/construction model, led to a filtering down of design assumptions and thus to a tightening up of the design.
Once more this demonstrates that physical models, produced in a digital or other format, still play a vital and substantial role in the design and transfer process.

A role that should not be underestimated!