

# THE GATE DOORS OF DISTRIBUTION CENTER ERNSTING'S MINILADEN

Alexander Suma

N s031596

E [a.b.suma@student.tue.nl](mailto:a.b.suma@student.tue.nl)

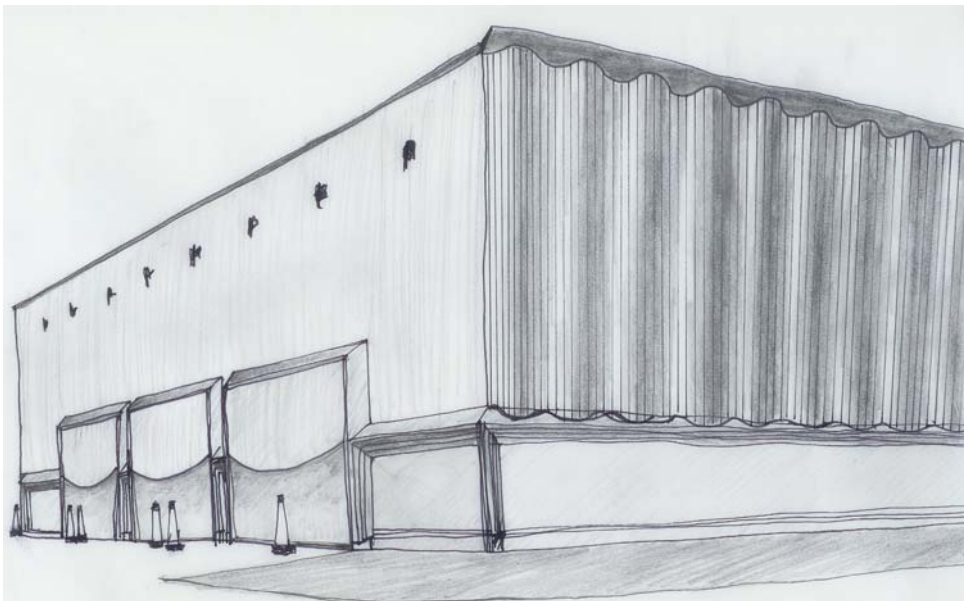
## SUMMARY

*This essay is about a part of a building I really admire, because it's functional, structural and has a great architecture. I'll tell you about three gate doors in a distribution center. The closed gate doors are nothing more than other gate doors, except for that weird curved incision. When these gate doors open, you'll be surprised of the effect of such a simple incision. The gate doors will twirl up like a gentle smile. This is also confirmed by lightning, material, color and the surface texture of the contiguous walls. This balance between the building and the gate doors confirm the concept and this magnificent simplicity and functionality.*

## 1. Introduction

In the lectures of the course “Production and Parts 1”, I’ve seen how the different guest speakers had their own point of view on the architectural designing. Every guest had his own opinion and laid his main point in a same sort of category, but in a whole other context. I figured out what the course wanted to teach us, which is a meeting on the combination of architecture, the making or creating of it and a very efficient use of a design with a big amount of structural understanding. This is really my thing. There also was a clear line to be discovered in the following order of the invited guests. The order went from efficient to more technical. The first speakers laid their main point on a greater view of efficiency and production to create architecture by optimizing structures, measurement and elements. I don’t think this is exiting because it is limited and dry stuff. Later guests speakers in the track emphasized the optimal and meaningful integration of the structure in architecture. By much knowledge of forces you can give bridges and large complexes, not only the exiting looks, but also a dynamic perception for its users. Also the construction process can be optimized by this. But you must be prepared to create new inventions for the design, because for many detail solutions there are no standard products available.

Searching for a building or a part of a building I thought about a structure of a gate door that would perfectly fit in the given lectures. In this design, made by Santiago Calatrava, Bruno Reichlin and Fabio Reinhart from 1983 till 1985, the architects handled on an exemplary way of integrating the concept, fitting in details and also by the simplicity of feasibility. I am talking about the gate doors as a building part of Ernsting’s Miniladen in Coestfeld in Germany. At first sight these gate doors look just like every other gate door like you see every day. When these doors open, they make such a weird movement, that you will not pass like that anymore. The simplicity of by only and solely making a curved incision in a flat surface of parallel lined slats and creating such a good architecture is absolutely magnificent.

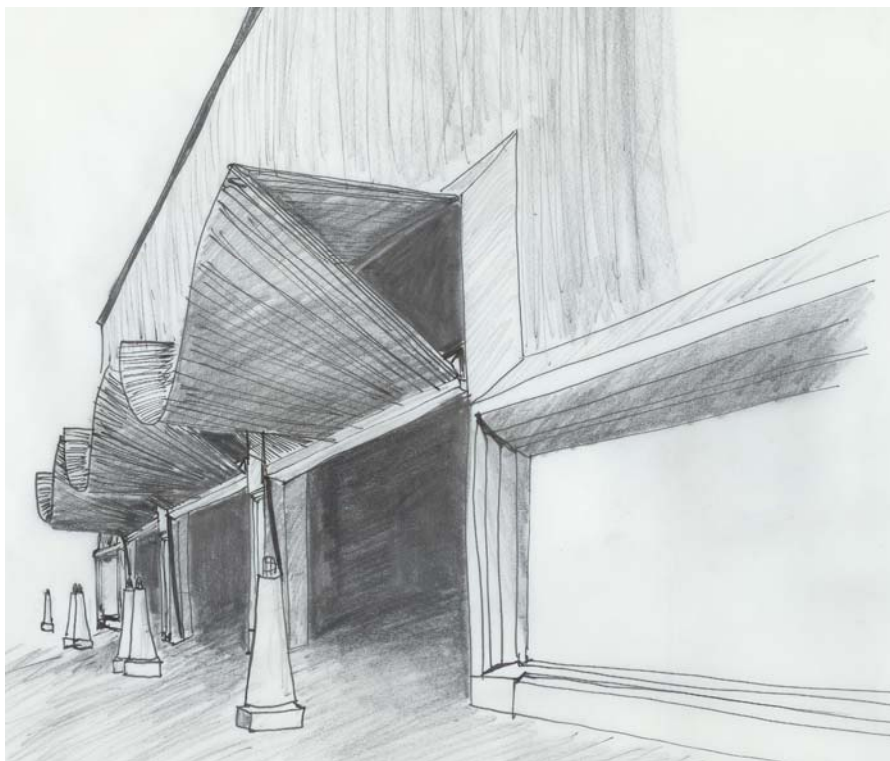


*Fig. 1: Drawing of the east- and south-façade.*

## 2. surroundings and conditions

The fit in of the gate doors really suits the greater concept of the total building. This design is won in a contest among several architects. The winning and made design is especially based on the covering and the incidence of light. There already was an existing steel structure so they only needed to design the covering of the building. The architects took account of the destination of the building that will be used by a casual-wear manufacturer who will use it as a distribution center. The movement and the falling of clothing have been brought back in the facades by using a corrugated untreated aluminum skin. They also tried to make a dynamic and moving appearance by playing with the incidence of light. When you will pass the building, it looks like it’s moving by these pulsating waves of light and shadow on the corrugated covering. So to say, the building’s skin corrugates the sun. Here exists a playful appearance that works very well on a, actually, simple box. Mostly I am not very charmed of these boxes in commercial and industrial buildings. But here I think that the inventive and simple usage is very well figured out.

Another aspect of the covering is that they made use of two different materials that mostly don't have any affection for each other. Concrete and aluminum are combined here in such a way, that they strengthen each other. The robustness and massiveness of concrete is used as a skirting-board, while placed above this, the plasticity of aluminum is completely used. It's about hierarchy of the material sorts, color of the material and surface structure. In this way the materials can strengthen each other. What people rarely see on the pictures of this building, because most pictures only show the gate doors, is that every façade has a completely other form and look. A main different are for example the corrugating waves. On the west-façade they made use of an undulated plate, while on the other facades they made use of an undulated plate which is also geometrically undulated. This is shown in figure 1. The north-façade also has a main different look than the rest of the building. In this façade is an office provided that literally sticks out the building. This part is also made of concrete and aluminum. All these items make the building not just a simple box with a nice use of material and creativity, but the building also has a total different character on his four directions. Although the facades differ immensely, though the facades are bounded by a high plinth and the delicate same character. The design and surroundings are also fed by placing the two geometrically more waved facades on the east and the west sunlight and the façade of the gate doors is then places on the southside. The office façade is situated on the north. This might not be very comfortable for the employees, but it works best for the facades and the play of light.

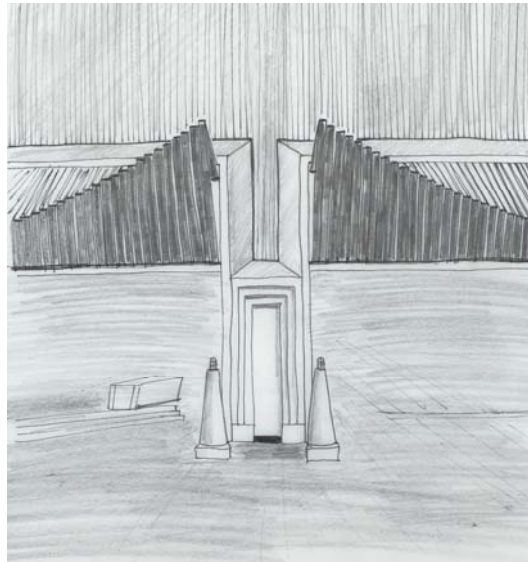


*Fig.2: Drawing of the opened gate doors.*

### 3. Perception of the architecture

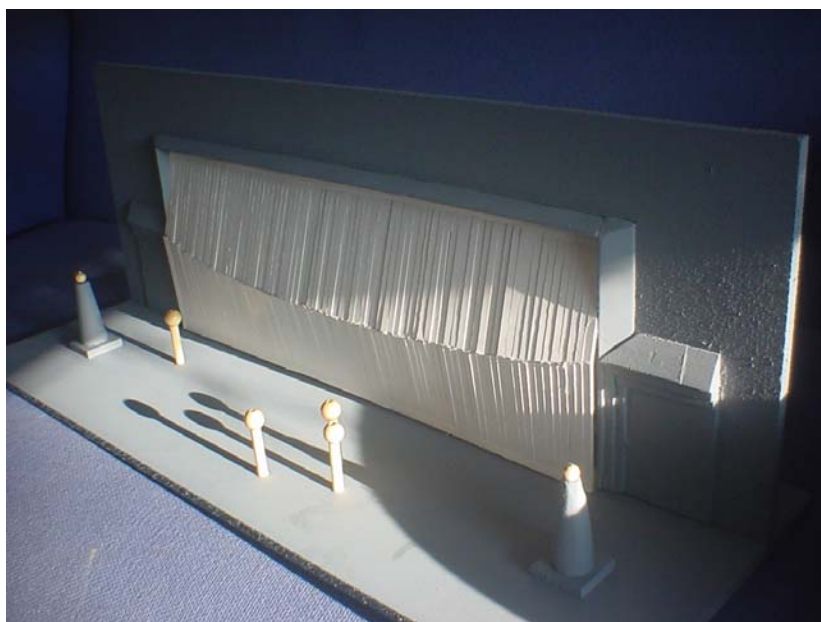
The gate doors are actually nothing more than a row of the same aluminum slats that have been cut through in the middle. By placing a hinge in the cut between the slats and then bend the slats, it will hinge like a knee. By setting a lot of slats in line next to each other, the cuttings will form a curved bow together. There will exist a strange appearance. The slats are joined at the top and bottom. At the bottom by a big beam that can go upwards by a rail. The hinge in the incision or cut between the slats is not connected to other hinges. When the door opens, all the knee frames formed by the slats and hinges, will bend. A deviation of height of the hinges creates a waved or curved line in the out coming knees, see figure 2. The ends are more sticking out than the middle field which lies deeper. A relationship exists between the independent knee frames and they form one whole. By observing and analysing, I was especially caught by just the use of a simple curved incision and discovering a marvelous gate door. I think the relation between the structure, the movement and the skin are exceptional. The façade is unique at first sight by simply and solely looking at the gate doors. When they are closed you'd wonder why these weird curved incisions are made and you can't imagine what would happen when these doors open. But when they open, it's like the building raises her gown and you may look inside for a moment. My daughter Sarah, who is almost three years old, said to me that the door in my scale model look like eyelashes. And indeed you could see the gate door as a friendly wink of an eye.

An interesting description of the gate doors comes from a quote of 'Thames and Hudson' in their book "The poetics of Movement" [quote: "*The open doors assume the form of a graceful cantilevered roof, with the change of geometry resembling a gently curving smile that breaks into laughter*"]. Here they hit the nail right on the head. I don't think there is a better possible description for these gate doors. They tell us that the light is pulsated in a combination of light and shadow in the waves of the façade like an honest smile. Arriving at the gates, the smile changes in an exuberant laughter, almost like a belly laugh. The appearance of the exuberant laughter is absolutely created by the upcoming ends of the gates, the movement of light is thrown up. Also the cantilevers make a positive contribution to this and accent this plastic movement even more. These cantilevers look a little like in a Greek temple. They are layered and cut, and create a missive character. The continuing and integrated plinth even has some sort of architrave or Greek beam. Also the gates are totally framed in that same line and form.



*Fig.3: Front sight of a cantilever.*

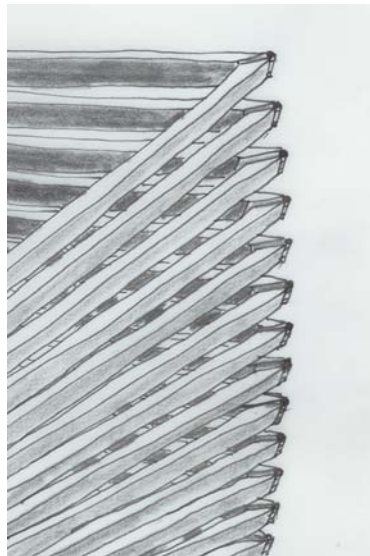
A very strong quality of the gates is the geometry and proportions that totally mislead in the pictures. Everyone would think that the bollards have just normal sizes of sixty centimeters height. In this scale the sizes of the building and gate doors are much smaller than in reality. The height of these bollards is actually two meters and forty centimeters! The dimensions of the pictures are now very different than on first sight. The measurements of the gate doors are five meters high and thirteen meters wide. Of course it's a lot of fun to fool people this way, while this illusion is only caused by the bollards. I think when you would stand in front of the gates, you will really feel as small as a pygmy or a little shrimp. Only the nearest tree gives you some sense of reality. In figure 4 and 6 I have given a comparison of real sizes.



*Fig.4: picture of scale model with closed gate doors.*

#### 4. Manipulability and solution of detail

To study and penetrate the design and manipulability, I made a scale model of one of the gate doors. I found out that, although it looks quite simple, it's really difficult to make these doors function. At first, I made the casing and saved a hole for the gate door structure. The casing is some sort of sculpture which in reality is also made of sculptural prefabricated concrete elements. So this is a matter of good measurements, and later on just pile them. The gate doors themselves are actually very sensitive for measurement variations. Between the slats there must be a fairly wide gap, so they will not touch one another. Even the smallest imperfection would cause this. When two slats would meet, they would push and then break each other. Therefore the straightness of the slats must be optimal. They can not have any imperfections and are not allowed to get them at changing temperatures and weather conditions. It's a real pity that the gates can never be really closed because of these openings between the slats. So it can never fulfil the function of a "normal" gate door in the matter of air tightness. Also the measuring of the curved line must be very accurate. In my scale model I first drew the curved incision. Then I divided the vertical slats with a horizontal cut. It seems done very well, but when I opened the gate, several hinges came out higher than expected by only the slightest measurement defects. In the gate doors two slats are connected by a regular hinge, consisting just a central pin like in every normal door. The slats are narrowed at the ends to make bending better possible. In my scale model I also noticed that the under beam, which lifts the door open, bends a lot in the middle. In the real gate doors, they made use of a very large framework to span the thirteen meters. A very interesting part of the structure is the rails in the sideward columns to lead the door upwards. They are placed under a wide angle, forward at the top and at the bottom backwards like a diagonal, to make the doors open with less forces and friction. In my scale model I constructed this diagonal in the wrong direction and I noticed that I have a less curled line in the opened gate door than the real opened doors have. The diagonal then also takes care of a more effective curving in the gate doors and strengthens the smiling effect. At last I must say that it was quite a fiddling to make these slats and I am really sure that this was also the case at the real gate doors. The detailing must have been perfect to be able to make it.



*Fig. 5: solution of hinges.*

A very bad, but unavoidable, issue is that the doors can never be closed completely. This is understandable, because when the slats and the hinges will be totally stretched out, the door can't be opened anymore. When someone would want to open the door, not all the knee frames will bend in the hinges, because the upwards going force will work as normal tension, and not as bending forces in the hinges. This is not the worst issue in the design and I must admit that it's unsolvable, but maybe it could have been disguised better. On some pictures is shown that the hinges stick out forward past the concrete list when the gate doors are closed, and this causes quite a big crack at the sides. In my own scale model this also happened accidentally, because I used a material which is too thick. Nevertheless I know that this issue could easily have been prevented. I'd say that it is caused by not regarding a second order of solution of details in the design stage which would then have been discovered in these moving elements. In the designstage of such a designs you should really imitate the movements very realistic to discover any defects in measurements. When you'd compare them to other "normal" gate doors, they would need a larger space at the front outside to open or lever up the gate door. Or an other common solution is a large rail structure inside to pull up a sectional gate door. By opening vertically in the rails at the side columns they are saving a lot of space inside and a lot of structural needing. Of course you will need to have some space at the outside for the bending knee frames, but this required space is only needed at a certain height.



Fig.6: Picture of scale model with opened gate doors.

## 5. CONCLUSIONS

The gate doors are a remarkable invention. The measurement, manipulability and material sorting are carried out to perfection. Nothing is allowed in these doors to be not in perfect shape and order, otherwise it will become a total disaster. The architecture, which is caused just by a single incision, is staggering. At most in the context of this building and how it's placed in. Reproduction without the casing building will not be an option, not only for its manipulability. Unfortunately there went some things wrong in the design of this building. This blame is totally addressed to the designers. It could have been avoided. But I think that many people will be prepared to put up with this bad connection. It's a great example for architects to make the appearance and the functionality change like this, with such a simple intervention like just a single incision.

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