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Anticipating a Possible Future Architecture

The most radical new feature in the architectural language of form of the future will be the yielding inclination to – yes, perhaps even absent argument for – the use of standards and thereby implementation of mass-produced repetition.

In contrast to that the advanced and still spreading information technology has cleared the way for a language of form, that permits satisfaction of a long nourished desire for individual, unique forms. A desire that will not only fill and improve the qualities within the pragmatic field, but which will also be able to contribute to a clarification of works within the aesthetic, artistic area, from which primary meanings will in a hitherto unseen naked manner be able to stream.

A Historical Equation

The thesis of the project is that the future language of form will depart decisively with the prevailing. Such breaks have been seen before in history. An analysis of the past one hundred years can show this, illustrated by the following equations, which ends up pointing forwards:

1. Until about one third into the twentieth century the various crafts within the building industry lived as a matter of course up to their name. It was real workmanship; everything was done on site, by hand and to individual measurements. In this way the builders could satisfy their own individual wishes – could get uniqueness.

This period can be characterised by the following equation:

WORKMANSHIIP + INDIVIDUALITY

2. The first machine age which from the end of the nineteenth century had lurked behind the scenes struck through from around 1920-30.

The displacement of workmanship by the upcoming industry becomes still more visible.

Where the materials earlier followed a more direct way from nature to its purpose and destination, an industrial link is now inserted which under "orderly conditions" prepare these as standard goods that are not meant for a specific purpose but are stocked and offered from there as "building bricks" for, in reality, anything.

The industrially manufactured standard goods bring about the repetitive, strict, light and unsentimental elegant form which as such comes out radically differently than the earlier form. With regard for nuances this is still the situation of today, and the equation now looks like this:

INDUSTRY + STANDARDISATION

3. But how will the world look once information technology strikes through?

Well, industry has come to stay; the old workmanship cannot compete here. On the contrary, the view of the project is that standardisation with the resulting repetitive expression must give way in favour of the reappearance of the individual, and thus the equation of the future looks like this:

INDUSTRY + INDIVIDUALITY

The Vital Information Technology

In two places in the project the information technology tools is decisively used.

- One is during planning
- The other in production

The response of the project is that there must be not only similarity but also identity between the architectural form and the message that this form communicate - or to be quite precise – is.

At first the project focuses on the structure. This is the message and thus, as mentioned, also the form.

In architecture everything has to be bound up with all the rest, and it is precisely in architecture that this is quite a lot. Therefore, you should not be able to get the knife in between – in our example – the form and the structure. These two have to mutually create each other.

And so it is – when architecture, understood as a creative art form, is on the agenda – with all the conditions we place opposite each other. In short, precision is in this respect the key word.

The load-bearing structure must, cf. the above, be precise. I.e. there can in the form be no deficiency in relation to static conditions. This is obvious, however, because otherwise all the structures would be undersized and would in reality collapse.

But likewise there cannot be a surplus in the form. True, one would with such an over-dimensioning have made sure that the structure would last, but the structure would not be the message. It would not be precise, i.e. identical with its form. On the contrary, the form has to be optimal, i.e. exactly identical with, or more precise, be the statics – i.e. the load-bearing structure. It is here, *during the planning* that the potential of information technology strikes for the first time.

New Design in the Project Phase

So far it has not been possible to satisfy the demand for a precision as distinct as described above. The difference is, to put it very simply, a question of the number of calculations (statics). So far these calculations have been made by (mainly) engineers on slide rules and later calculators, and this method does, of course, have its limitations in respect to the number of calculations. This means that the optimizations have so far purely been a tendency, but not - well, optimal. This has not, however, been as disincentive as, which we will see soon, a more optimal form under all circumstances not been within reach as far as the question of practical production is concerned, and thereby the demand for such a distinct precision been purely theoretically founded.

The new forms are born as follows:

The architect sketches a structure with a specific form, which is imagined in a specific material.

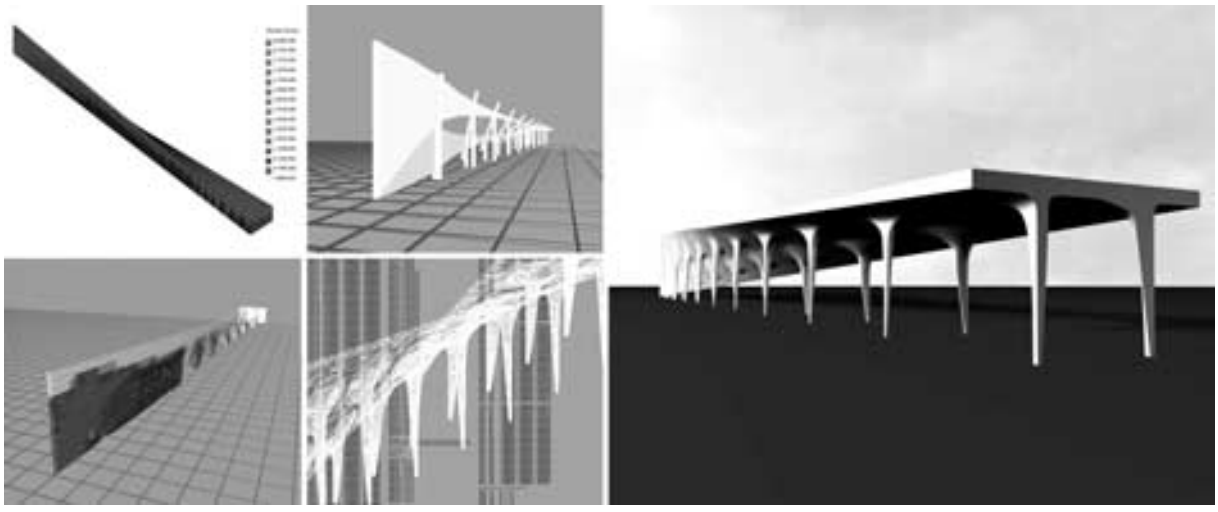
Already during this sketching the structure is optimized in its form, but only a tendency.

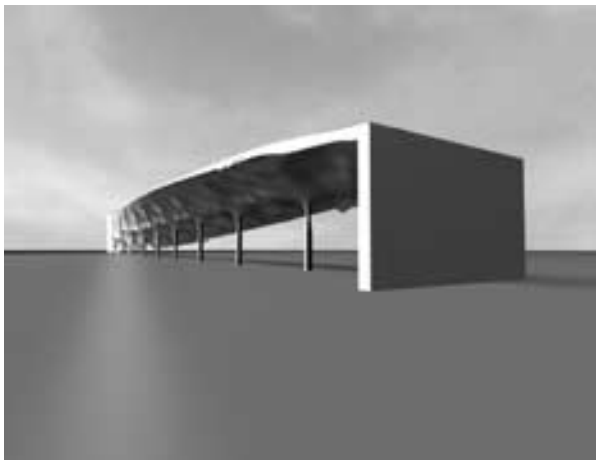
The architect uses his rather simple general knowledge and experience of basic static principles to create form. Where the tensions of a given structure is the biggest the form becomes the strongest and vice versa. But the form is still a tendency. For instance, offset loads which will undoubtedly change the form when it is later optimized have not been taken into account.

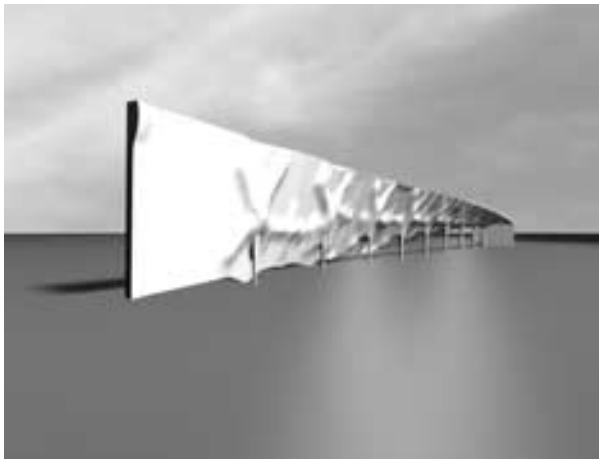
The architect sends the project to the engineer who supplies his computer with the relevant data, after which the structure is calculated in a special form optimizing programme. A programme that delivers a real (contrary to a tendency) picture of where the largest forces occur, where the smallest occur and for that matter how the forces are distributed in the structure, ungraduated between these two extremities.

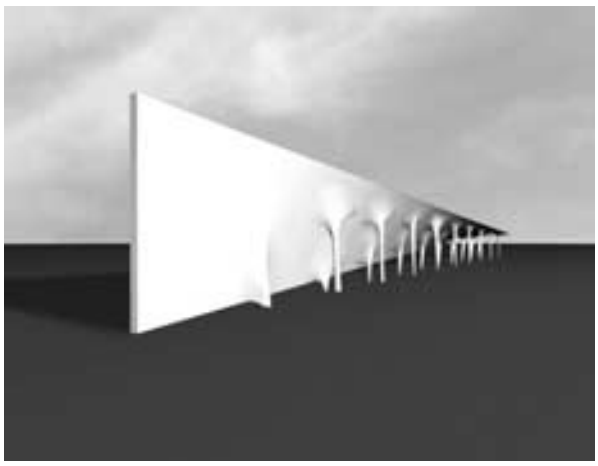
This operation brings about a new form as the optimizing points very precisely to the places where the form must be strong and where it must be fragile. The new form is returned to the architect.

Building forms in concrete, generated by form optimization









The architect assesses the form based on which he makes further sketches. Not as "free" design but based on the "rules of the game" that he himself, the engineer and not least the optimizing programme define. For instance, variations in the distance between the columns will have consequences for the height of a beam, which the columns were intended to possibly carry.

The project is sent back to the engineer who re-optimizes resulting in a changed form. Back to the architect who ..... etc., etc.

In this way the ping-pong goes back and forth until a satisfactory form has been obtained: A form which partially (but only partially) is created by the computer. A requirement is the very creativity of the architect. At the same time the form is only partially created by the architect who for one is dependent upon the IT-tool.

Such a practice gives "unruly" shapes. Ungraduated shifts between the tortuous shapes of all sorts, where no building part has the same cross section in two places, is the result of these new "rules" and – which is of the biggest interest – potential.

Similar unruly shapes have, of course, been launched before in modern architecture but have rarely been realized as these kinds of projects have on the whole always been rejected as being, in every way, unrealistic.

That is history now – and here, in the production phase, the IT-potential strikes for the second time.

New Form in Production

The production apparatus has in quite a few areas been changed into being digitally managed. This means that the work is done by robots that are programmed for specific operations that can be extremely advanced and often "intelligence based". Operations that the robots perform at high speed and distinct precision. The motor industry, the electronics industry, the furniture industry, just to mention a few examples are typical exponents of this new technology.

The building industry, however, uses these highly technological options only to a small extent, and when it does happen it is often in a "superficial", unimaginative and not very far-sighted way. In most current cases the robots are producing the same product that was earlier made by hand. A sort of pastiche of past technology. Probably able to compete for time and price. But what is the new?

New technology and new production forms must, which is also shown in retrospect, be expressed in the products and thereby change and develop our world of form,

But where do the robots in that way differentiate conclusively from the past technology?

Robots are not dependent on standards. This is what is really new, for it is precisely the standard merchandise, not least within the building industry, that has characterised the past century.

The robots have no favourites among forms, for instance as straight lines, right angles and pure circles; robots do "what they are told".

Therefore, the reservations are eliminated about the "unruly forms" we saw before, the forms that came into existence as the result of the form optimizing work of the architect and the engineer.

And with this the way is prepared for brand new architectural openings; namely the possibilities to realize architecture with a high degree of individuality, and great freedom of form.