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The Hidden Geometry of the Architecture of Herzog & de Meuron
Digital Tools and Design Practice

Alexandra Castro

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FACULDADE DE ARQUITECTURA

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The Hidden Geometry of the Architecture of Herzog & de Meuron

Digital Tools and Design Practice

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C.5
Harry Gugger

A.05
Harry Gugger.
Architect at HdM (1990) and a Senior Partner from 1991 to 2009. Partner in Charge of the projects for TM1 and TM2.

"This is too generic; this is not the Tate!"

Conversation with Harry Gugger
Harry Gugger Studio, Basel, February 20, 2020.

Alexandra Castro (AC): In my PhD, I'm studying the relationship between geometry and digital tools, and I decided to take Herzog & de Meuron as the main case study. I'm interested in understanding what has changed in their architecture from the moment they introduced digital tools in their design practice.

Harry Gugger (HG): Jacques and Pierre were rather cautious in their approach to the computer. I was working on the Signal Box and the Engine Depot, and because this last one was such a big and repetitive project it didn't make sense to draw it by hand, so I bought my own computer. The Engine Depot was thus the first project which was drawn by computer. I used "Top CAD", a software with which you had to do a lot of scripting yourself because it was not very developed.

AC: Was the Goetz Gallery designed by hand?

HG: Goetz was, in no small extent, designed by hand. It was drawn mainly by Mario Meier, a crucial figure in the office. He was an experienced collaborator, he knew how to construct things, and he always did beautiful hand drawings. He had his style.

In the Goetz Gallery, it was a mixture, like in Tate Modern 1. Of course, in TM1 it was all CAD drawings, but the details were often still hand drawn.

So, up to around 1990 you have hand drawings, and then CAD starts to move in.

AC: This diagram is from Kai Strehlke. He did it when he was in the office and it shows that in this initial phase in the office there were only hand drawings, and at a certain point, around 1990, as you said, CAD was introduced. Afterwards, more or less around 2005, digital tools, like scripting, and a digital workshop, were introduced in the office, roughly at the same time that the DTG was created.

HG: I employed Kai at the time. I had a former PhD student, Russel Loveridge, whose thesis was about digital production, and Kai was his friend. They knew each other from the CAAD chair of Prof. Ludger Hovestadt at the ETHZ. Ludger is also a significant figure in this whole digitalisation process.

AC: In my PhD, I decided to study, in particular, Tate Modern 2 because it is a project in which scripting was used to support the design of the brick facade. However, the design process for TM2 was the result of a close interaction between analogue and digital, in which physical models played an essential role in the definition of the solutions. Tate Modern 2 interests me also in a particular way because when you look at it, you don't see a "digital building", but rather a classical architecture that is searching for relationships with the surrounding context.

I spoke with Kai, who was directly involved in the scripting of the facade. I also had a conversation with Andreas Reeg, the architect responsible for the detailing of the brickwork, even though he joined the office in London only at the end of 2008, when you were concluding the planning application that was submitted in January 2009.

HG: If you want to talk with someone who was really instrumental in the facade development, it is Wim Walschap. He is now a partner at HdM. He was sort of Mario Meier for the Tate Modern 2 project.

He came from Belgium, where he was a collaborator of Robbrecht en Daem, which is an office with very high sensitivity in construction, and he brought that with him. Wim was developing the facade. If there was a key figure in terms of the regular tools, that was Wim. The design was then translated to be more efficient and to allow for better construction with the help of digital technologies. From my point of view, for as long as I was in the office, the design was hardly ever driven by the digital. The digital was always a tool.

A more extreme project is, maybe, Südpark. It was the very first time where we really used scripting. This building is located in a plot between the open field of the railway tracks and a rather ordinary road, defined by traditional buildings with small windows. The idea was to change the scale from an orderly facade to a more open facade. We started drawing by hand, but this was a lot of drawing, and the human being always gets annoyed. As such, I never had the final result, because collaborators started to get annoyed, having new ideas and forgetting about the set parameters, or introducing new ones. So, I never had a complete result, and I was getting upset. So, we started to work with Steffen Lemmerzahl, an assistant at the chair of Ludger Hovestadt at the ETHZ.

Do you have our design for the Prime Tower in Zürich in your map?

AC: The competition for the highrise in Zurich? I don't have it here.

HG: As I mentioned, the engagement with digital production started with Russel's employment at my chair at the EPFL and our close connections to Ludger's chair at the ETHZ. Kai, Russell and Steffen are all pupils from Hovestadt, from his early period at the ETHZ. It had a huge impact when he came to the ETHZ, and there's a whole generation which is still around, like Kai, working for Blumer Lehman now, and Russel, who is now the director of Switzerland's National Research Competence Centre for digital production [the NCCR Digital Fabrication].

So, we brought Steffen in because of the special highrise regulation we have in Switzerland, the "two-hour shadow". We wanted to have a digital tool to calculate this "two-hour shadow" for different forms of highrises. Consequently, we also collaborated with him on the Südpark. This project is all about parametric design, because, as I said, we never got to a full result with manual tools. I think this was a key project concerning the application of digital planning and production, and it also helped, of course, to build it economically because it has so many different windows.

AC: Kai told me that the ETH first developed it. However, I suppose that the result was not "good"—this is not the right word—but it did not relate the external appearance to the interior planning, so at a certain point Kai took over the script and worked on it.

HG: That's true, but I don't think it is about good or not good, because first we needed to develop it promptly. This project has a history. In the beginning, it was very different in its appearance, but it failed. In Basel, we have what is called the "Stadtdbild Kommission", a design panel which I think is unique in Switzerland, since it is based on an aesthetic law in Basel in which you have to comply with its "Paragraph 58". This is not only advice, but you can also fail or not, and if you don't comply with it, you don't get the planning application—and we failed in this project. That's why we needed to develop a new architectural expression, and that's how the CAAD department got involved. They worked with us for as long as we had to come up with the conceptual idea to be presented to the design panel. Then, when we got the planning permit, and we got to tender drawings, that was when Kai came in. But it was not because they were not good enough. They simply had fulfilled their job, and so it was passed on to our internal development team.

AC: I also spoke with Volker Helm, because of these projects around 2000 in which we may perceive that there's already something of the digital. He also came from the ETHZ.

HG: Well, he came from the ETHZ to work with us, and then he went back.

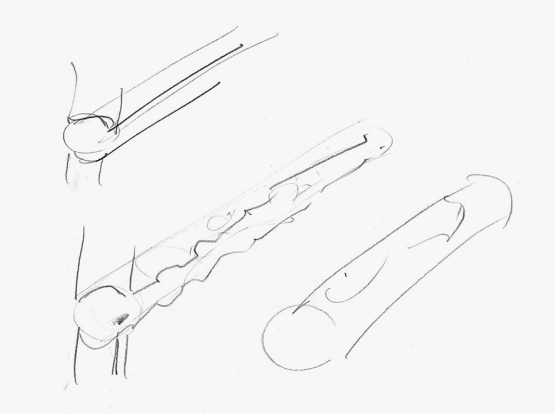
AC: I suppose Volker was a student of Kai at the CAAD chair.

HG: I think you might be right; Volker was a student of Ludger Hovestadt. Then he joined us, and afterwards he wanted to do a PhD, so he left again.

AC: He worked on Prada Levanella. For this project, he developed one of the first scripts for the office, a very simple one. Volker told me as well that it was made into a large 3D printed model of this project, which was produced by outsourcing.

I know that you were the partner in charge of the Schaulager, so I would like to ask you one thing about it. Is there anything digital in the design and construction process of the windows?

HG: Yes! The problem here was simple: how to do an opening into such a specific wall. Of course, we had tried standard windows. However, we were never happy. When I worked on the Tate, Jacques would often join me, and so we discussed the matter on a flight to London; that's when the idea that the window should be a homologue of the wall surface came up. The window should actually be like the surface.



A.06
The deformed tube. Sketch by Harry Gugger (2020).

So, we started to think about how that could be done, and we began to think about frottage. Do you know what frottage is?

AC: Yes, it is the same technique that you used on the doors.

HG: The window is the same but blown up. Can I draw? If you take a cylinder and you start to deform it, and then you start to roll it, you get to the surface of the wall. This surface appears in the cafeteria and the shop. It's always the same shape but in different scales.

So, on that flight, we discussed the window, and Jacques said, "It's like if one would drill through the wall."

When I came back to the office, I asked a trainee to take a tube, to hammer it and then to roll it out, and that's how the inner surface for the cafeteria appeared. If you now put the deformed tube in a wall, you get to this special form, but, at the same time, this leads to tons of problems, like water collecting at the deep points. So, we took this deformed tube and made a photogrammetric reading. This gave us a digital set, and then we started to push and pull the points, which now were all controlled. Wherever it is the lowest, the water flows into and that's where we put the drainage tubs. So, this is all highly technical, and it was only possible to solve the problems with digital tools.

The imprinting of the metal doors did also rely on a digital file, which allowed us to mill the pressing tool. Everything is digital.

AC: But you started with a physical model.

HG: Very often; also in Tate Modern. Here it was the brick. It was all about the brick.

Do you know all the itinerations of Tate 2? There are three, all based on the pyramidal form that derived from the "rights of light".

AC: Ok. So, it comes from the master plan that was done between 2003 and 2004?

HG: Yes, it does. The owner of the adjacent plot wanted to develop his property. In England you don't have a zoning law, so you can build, for example a tower, wherever you want. If you get all the stakeholders behind you, no one can stop you. But once a tower is built, you might not be able to build next to it anymore because of the "rights of light". So, the Tate knew that at some point this would lead to a problem, and they needed, not knowing what was going to happen, to defend their own development property. The people who developed the tower were first interested in buying a plot from Tate, so we were in contact with them. They would show us what they wanted to do but they would only do what we agreed upon, and that's how the pyramidal form came about. So, this was a given.

On the first itineration, the pyramid was clad in Corten with big, flash windows. This was already a fully developed project, ready to go for planning application, and we presented it to the trustees.

AC: When did this happen? After the master plan?

HG: Yes.

AC: Was this the first study?

HG: Study?! It was already a commission to design Tate 2.

We showed this to the trustees and they said, "It's all very rational and reasonable, but it has no "wow" effect. What you design has to have a huge "wow" effect. Why? Because we need to raise money, and we don't believe that, with this project, we can raise the money." And that's how the glass pyramid appeared. That's when we started to overdo the pyramidal shape, with the blocks all out of glass.

AC: Is this the Corten version that you are talking about?

HG: Yes, exactly.

Then we presented the glass version to the trustees, and they said, "Wow, this is good! We like this. This is exactly what we were looking for."

After the meeting I flew back with Jacques, and I told him that, in my opinion, we should not proceed with the glass cube design. I said, "This is too generic, and it could be anywhere. This is not the Tate!" Jacques asked, "What do you mean by this?" I replied, "I think we should be much more restrained; we should create a more coherent project. We should not have Tate 1 and then something new." Jacques actually shared this opinion and that's how we moved on to the third itineration.

AC: I understand, because from the beginning you were saying that Tate Modern should be one coherent whole, and in the glass versions it is not like this.

HG: Yes, and this is when the brick came in.

Of course, we first tried the stacked box version with brick, but it was too clumsy. So, it was clear that we should go back to the pyramidal form clad with brick, and that's how the final version started to evolve. We didn't want to have the ordinary size brick, and so the double brick came into play. We also wanted to have a quite archaic form and, at the same time, we wanted daylight penetrating the facade.

AC: Maybe to speak about Tate 2 we should return to Tate 1, which is where everything began. Why was Tate Modern 1 so special for HdM?

HG: It's the project that made the company world-renowned. It is as simple as that.

The company was already well-renowned in the world of architecture, but was not publicly recognised, like, e.g. Richard Meier or Mario Botta. The Tate project made the office popular. It was an important stepping stone in the evolution of the office.

If you ever write about Tate, you should have an interview with Nick Serota. He is the figure you have to talk to, because he is the Tate! Of course, many people have made important contributions. Still, the nucleus of it all is Nicholas Serota. He is a very special man, highly intelligent. Intelligent in two ways, very rational, but he is as much a humanist as he is a technical scientist. He unifies these two worlds, like you often see happen in architects. Nick Serota was a very good client. Not just from top down; in a way he became a partner. Generally, as an architect, you educate the client, but, for once, there was a client educating us. He has an incredible aesthetic sensitivity, he would comment on each drawing, and all his questions were pertinent, so there was a lot to learn from him. Also, for this reason, the Tate was a crucial project.

Also because of the political situation. The project happened when England started to open up and to change from conservative and technocratic-oriented to a progressive, culturally minded country.

AC: And now they are closing again.

HG: Now they are closing again, they always open up and then they close in again. But that is another story.

Tate Modern played an important role in the transformation. It merely brought contemporary art and, anyway, the art world, to the UK; it also had an impact on architects like Caruso St. John or Sergison Bates. This whole generation was brought to the surface in this climate.

Tate Modern was a turning point for the office, but at the same time for London.

AC: Before choosing the winning team, I know that the jury visited some of the buildings designed by the architects who were on the competition because, I suppose, they were searching for someone who they could work with.

HG: Absolutely, and in this, we have to be very clear, Jacques played the key role.

Jacques was able to create a close relationship with Nick, like no one else in this process. For Nick, it was important to find a design competence, but also an intellectual competence in the broader sense. He liked the fact that the office was, relatively speaking, compared to the others, a young and an upcoming practice. Nick Serota didn't go for fame, but he could have fallen for it.

And of course, the office proposed an intelligent and respectful project, respectful to the existing structure. Others made mistakes, like David Chipperfield, who cut off the chimney.

AC: Among all the proposals, yours was the most simple, and, from the external appearance of the building, it seemed even like you didn't do anything.

HG: Not anything, but very little.

AC: And in a very careful way, because it was very respectful to the existing building. In your opinion, what are the aspects that best synthesise the intervention on Tate 1?

HG: Very simple. The Light Beam. The Turbine Hall and gallery spaces that foreground the art. That's it!

AC: On the monography of Tate 1, there are some studies for the north elevation in which we see that different design options for the facade were taken into consideration. As usual on HdM, before accepting one solution, you try unexpected things that may open up other possibilities. I notice that in some of these studies, the facade was much more transformed. I remember a drawing in which there was a continuous opening on the ground level, or another one in which the windows were cut out on the facade in a very radical way, which reminded me of the Küppersmühle Museum.

HG: But Küppersmühle was later.

AC: Yes, it was later, but some things that were studied here reappeared later in Küppersmühle, and then also in Caixa Forum, like the cut-out at the ground level.

HG: That's again a different story.

For the Tate, it is the "light beam" which signals the transformation, because it is emitting light; it's about light and not electricity anymore. And then to open up the Turbine hall...

AC: "It's about light and not electricity anymore"?

HG: Yes, a power station is about electricity and a museum about light. The bay windows in the Turbine Hall kind of reflect the light beam from the top and bring the light topic into the Turbine Hall.

But to come back to your question about the facade, yes, initially we altered the existing building radically, but, more and more, we became restrained, accepting the building as it is. The interventions were reduced to the ground floor because of the restaurant. So, the specific functions made the exceptions and the rest stayed as it was.

Caixa Forum, in turn, is all about public space, actually the lack of public space. There was the Paseo del Prado, the building, and in-between, a gas station.

The client came to us because of our work on the Tate. This is a funny story.

At HdM we had an old bell. Not an electric bell; one that you pull with a string. At lunchtime, Pierre and I were the only ones sitting in the villa, and someone rang the bell. We were sitting on the top floor, and we didn't react. Then someone rang the bell again, and I said, "Pierre, do you expect someone?" and he said, "No!" To which I responded, "I also do not expect someone, so we don't go down."

"No, we don't go down!"

The bell rang again, and then I said, "Ok, I will go to see who is insisting." I went down, and there were two distinct men, very well dressed.

They asked, "Is this Herzog & de Meuron?"

And I said, "Yes. Do you have an appointment?"

"No, no appointment, we want to talk to HdM."

"You come here and you don't have an appointment, so who do you want to speak to?"

"We want to speak to HdM."

I said, "Well, there are many people working here."

And they said, "We have a commission; we want to build a museum with you."

To which I said, "What!?"

They kind of came across as madmen, but at the same time, they looked very proper. So, I said, "This is Switzerland, it is lunchtime, and nobody works."

"Well, we happen to be here. Can we come in?"

I said, "Ok, come in." I went up to Pierre, and said, "Pierre, listen, there are these two guys, and they want to build a museum with us." So we sat down at the cafeteria, and after a while we understood that they had this power station in Madrid and they were simply thinking, "London power station turned into museum; Madrid power station turned into museum". A week later, I was in Madrid.

But nothing worked out! They had a huge program, so I told them, "You can work with this power station, but you won't get the program you want, or you can build your program, but you need to go somewhere else."

They said, "We want both. Our program in this power station."

And I said, "Ok. But you also know that we are in a second row. There's Paseo del Prado, there's a gas station here, and there's no public space. So how should all that work?"

And they said, "You are the architect; you make it work".

I replied, "Ok, but you know what, this gas station has to go."

And they said, "No problem, we will buy it!"

But there was still not enough public space, so that's why we took out the socle. The plinth of the building was in granite blocks, and if the client would have listened to us, these granite blocks would still be there, because we wanted them to be dispersed on the ground as seating opportunities. They didn't like the idea, but it would have been beautiful. At the end, we of course needed more area; that's why the building extends below ground and on top of the existing building.

AC: When did Tate Modern 2 start? I suppose that on Tate 1 there was already the idea of making an extension. When you designed the Turbine Hall, I think the decision of going underground was also related to the use of the oil tanks as exhibition spaces.

HG: The oil tanks were originally part of Tate 1. But many things were not done in Tate 1 due to budget cuts, because there was only a restricted amount of money available. There would have been an art storage, and the exhibition spaces were extending into the oil tanks. This is again inherent to the concept if you have the Turbine Hall as a covered street; a street has two facades, and you have shops on both sides. It was always clear that the Turbine Hall has not only one face but two.

So, there were the oil tanks on the other side, but this wasn't affordable. There was also the idea to have access from the south, but this didn't work because of the transformer station. The old transformers occupied the whole Switch House, and only when the transformer station was reconfigured, the opportunity to transgress it came up. So, in a way, Tate 2 was always there. If you ask me 'when did it start?' It started with Tate 1, but we hit the wall.

AC: In some composite images, I saw that there was also the TM3.

HG: Only on the master plan level. The idea was to create a facade in front of the remaining Transformer Station.

AC: So, everything began with the master plan. Knowing that, afterwards, it would not be easy to build, Nicholas Serota decided to develop a master plan to ensure, based on the "rights of light", the general envelope of a building that would be designed later. When we look at this picture, we see many of the concept models that were done during the "schematic design" stage. Can you please explain to me what happened in these three years, between 2005 and 2008?

HG: As we discussed before, this was the period when we designed the three iterations of the TM2 pyramid—the Corten, the glass cube and the brick version. The thinking was always the same. It was about how to accommodate the necessary program within the given restrictions, and, as such, the idea of the pyramid was always there.

AC: In 2007, HdM concluded the report on the glass version. During 2007, I have the idea that the process was kind of suspended, maybe because Tate needed to get more money to continue, and I noticed that it was during this period that the direction of the project changed from the glass to the brick version.

HG: If I remember well, we changed the design pretty immediately. We were forced to do so because otherwise the trustees would have gone with the glass version. We had to tell them that we didn't want that to happen, and this was not so easy. We had to tell them that we would like to redesign again for the third time.

AC: The report of the glass version is from December 2006 and the report after, the one regarding the brick version, is from August 2008.

HG: Don't ask me about dates, but believe me, we immediately continued to work; there might have been, at some point, for some other reason, a stop, but this was a continuous work process until the complete schematic design report for the brick version was delivered in August 2008.

AC: What did the trustees say about the brick version? How did you explain it to them?

HG: We criticised our own work, and we told them that we had been overreacting on their wish for a "wow" factor, that the project became too glamorous. We told them that we should go back to a more restrained, more coherent project, emphasising the ensemble, and that this was not least a question of materiality.

The trustees are very intelligent and cultivated people and there are always artists on the trustee board, so they understood what you were talking about. And we never got to the trustees directly, we always spoke to Nick first, and Nick knew how to handle the Board. These were all very carefully designed processes, and Nick is a political animal; he could act as Prime Minister of England. His mother was the first woman in parliament, so he must have inherited that political talent.

AC: So, you decided to simplify the volume, to work with the brick, and you chose to use the same brick.

HG: Yes, you are right. The new brick comes from the same quarry as the original ones.

AC: Then a lot of work was developed on the size, bond and colour of the brick, always trying, in a certain way, to innovate.

HG: What we proposed was far from traditional brick construction, and rather expensive. The bonding was not done with mortar, but with metal bolts. This is very difficult, very delicate and very elaborate. The brickwork looks like masonry, but this is not the masons' work, this is a revolution in the use of brick and actually a bit crazy.

AC: And everything was developed taking into account the whole system of the facade.

HG: We wanted to work with daylight, but we didn't want to have big openings. But if you take the standard size brick, and then you start to lay it down, there's little opportunity to bring light through. If you go for a double size brick, you can create bigger openings for more light. The system becomes more efficient in terms of light. The question was very simple: how to create a uniform architecture allowing for daylight to penetrate, allowing for the easy integration of windows, and working also with the pyramidal form. It is as simple as that. These are the parameters with which you have to solve the problem.

AC: You also worked on the colour of the brick. The colour was also an important issue, right? I saw some composite images of the facade where we see a kind of gradation that goes from darker on the bottom to lighter on the top.

HG: The idea was to use the same kind of brick and, actually, we went back to the quarry to source the brick from the same place as the original one.

AC: I saw that you identified, in the masonry of the Bankside power station, three types of brick: the red one, which is in the plinth, and then the yellow and the yellow-brown that are on the upper part of the building, and you tried to develop a gradation with the same range of colours.

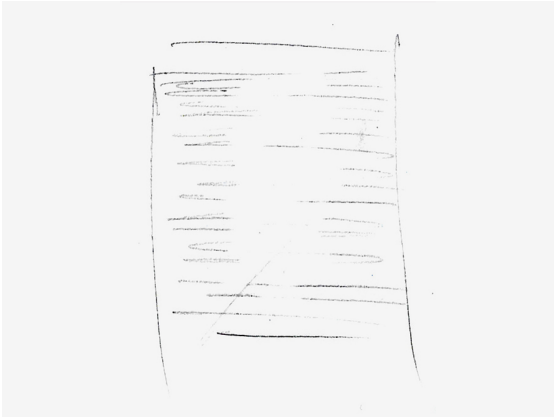
HG: Yes, this was the original intention, to replicate the graduation of colours as in the existing facade.

AC: But in the end you decided on the same colour range from the bottom to the top.

HG: Well, don't we have the red brick in the bottom?

AC: I think it is the same kind of bricks from bottom to top.

HG: On the northwest corner? I don't remember, but I think there is a strip in the connection point between the old and the new building, only for the plinth.



A.07
The concept of the Signal Box facade. Sketch by Harry Gugger (2020).

AC: The geometric shape of the building is not simple, because it is a twisting shape made of vertical and inclined faces that intersect each other along oblique lines. This shape, together with the perforated brick wall, brought out some very complex geometric problems which are particularly visible, for instance, in the corner.

HG: Yes, we liked that complication.

AC: Were you aware from the beginning that this would be an important and complex issue to solve?

HG: Of course. This was very interesting, because you could see a ziggurat in this volume. You could see an ancient building or a ruin in it, and this is all very conscientiously decided. This is all part of the architecture, and it allows for many different perceptions. It is open, and it offers food for the eyes; it is tactile, it makes the eye engaged.

AC: I remember that in the report in which the brick version was presented, it was mentioned that, for the corners, a special brick would be used, a larger brick that would give stability to the edge. But then, in the following reports, this solution was changed, and in the corners we have a kind of porosity; it seems like everything is going to fall down. Jacques, at a conference, said, "How we use the edge, where the two sides come together, to create this kind of porosity which defines, or also reveals, the construction behind it, it is a simple but important detail for how we use construction as part of the idea of the whole building."

HG: The skin of Tate 2 has a lot to do with the facade of the Signal Box. This was drawn by hand, and this is what this is about. It was almost like erasing the precisely drawn lines. It is an interesting impreciseness.

The antique Greek architecture is all about that. The building collapses, the columns are shaped, the plinth is curved. The Greeks did this because you make the building appear more monumental.

I think this should be a celebrated quality of architecture. If I take your face and I mirror it, you look pretty boring. You are more beautiful because your face has two sides; this makes you more interesting. I truly believe that if something is too perfect, it revolts you. It is like a sign of aggression, and the architecture that works with impreciseness is more acceptable, is more human.

AC: I spoke with Andreas Reeg, who worked on the detailing of the brickwork, and it was clear from his comments that, from a construction point of view, the ideal solution was not the one with the perfect corner. On the contrary, it would be more reasonable and even cheaper if the corner was imperfect. In this way, bricks would be regular, the holes inside the blocks would be all controlled, and the pieces could be standardised.

HG: Yes, that's how we wanted it to be!

AC: I would like to ask you one thing regarding the openings.

The brick veil is the element of the new building responsible for the relationship with Tate 1. This outer skin is a device that, being autonomous from the structure, allows it to control, through the openings, the scale and the composition of the facade.

I know that some technical issues, such as daylight and ventilation requirements, interfered in the design of the openings. However, I think that there is also something of the architectonic about it.

I noticed that all the windows are positioned at the corners or creases, which accentuates the volume continuity. Then, in correspondence with the Switch House rooftop, the window at level 5 runs all around the perimeter of the building. The same happens on the top of the volume, at level 9 and 10, so when you look at the building, you may notice a horizontal tripartition. It is as if the building had a base or a plinth, then the main body, and on the top, a cap that concludes the volume.

HG: Absolutely! You could call it the Renaissance principle of topping a building. These are all important measures to define the top of the building, and, of course, it has a function, because it is the viewing terrace.

AC: How do the partners interact in the design process The few sketches I found in the archive are all from Jacques and Pierre, and they always focus on the main concepts of the project, like these. What is the importance of the sketches in the design process?

HG: The project is controlled in dialogue. For Siza, the sketches are essential; for Herzog & de Meuron I believe that the dialogue is important. This is inherent to the fact that Jacques and Pierre have started the practice together, which allowed them to open up to other partners. Very often, it is a review process, like in school. I don't know how it is right now, but Jacques and Pierre used to play an important role because they were the only ones connected to every single project.

There are projects in which I was not involved. I, of course, knew about those projects, but would only be part of the discussion at my discretion. But in projects like the Tate, I was the one working with the team, and, for example, an essential part of this project, the vertical circulation, I developed with two very young architects. The whole circulation is a project in itself. They formed an almost independent team, they were really young, worked in their own little room, and it was my role to connect their work with the other parts of the design, to coordinate it with the rest of the project. We had the outer form and then we had the inner circulation. Tate Modern extension was a complex project and I believe that the circulation was more important than the outer appearance. The facade is one thing, and of course complex and interesting, but the real project, the essence of Tate Modern 2, is the vertical circulation because you should never build a museum on ten floors if you are not forced to.

AC: On a text about Tate Modern 2, Beatriz Colomina speaks exactly about the topic of the museum made of ramps, which has its origins in some models of Le Corbusier and Frank Lloyd Wright. Even Ibere Camargo Museum in Brazil, by Álvaro Siza, is made of ramps. On a recent conference in Porto, Siza mentioned that when an architect has to design a museum, he cannot help thinking of such important buildings from the history of architecture, like the Guggenheim in New York. And I think that Tate 2 is also one of these examples.

HG: Tate 2 might have become another reference for how to organise a vertical museum. But, as I said, this was not intentional; we were forced to organise the extension vertically because of the forces of the real estate market.

AC: What is the role of these study models in the design process? I suppose that in the initial phases they are highly significant.

HG: Not only in the initial phases are the models important. We built all kind of models throughout the process. Models are essential for the practice, and everything is decided and discussed based on models.

AC: At a certain point in the design process, you realised that the scripting could be useful as a supporting tool, and Kai developed a very well-organised script that became operative in the design process of the brick facade. However, Andreas Reeg explained that the solutions and decisions about how to do this were first defined on the physical models. Only after, when they were already established, were the rules transmitted to Kai, who would include them in the script. So, the script was not used as a designing tool but a production tool.

HG: Yes, you are absolutely right!

AC: In your opinion, what had changed in the design process of HdM, more or less around 2005, when the digital tools were introduced?

HG: What had changed? Well, I think nothing.

This is my conviction, but I'll try to be as objective as possible. The digital tools, as the name says, are simply tools that certainly allowed for processes to be feasible and economical which otherwise

A.08
Stadiums. Sketch by Harry Gugger (2020).

would not have been, and of course, they had a huge impact on the evolution of the office. You can describe this in dichotomies: small–big, simple–complex, and of course, local–international, in that the digital plays a key role, it allows an office to control projects in the full range these dichotomies present.

When the office worked on "Pilotengasse", the housing project in Vienna—and that is not so long ago—everything was drawn by hand; the only technical tool was a fax machine. This fax machine worked with this coated paper, and every evening at six o'clock our collaborator in Vienna, Gerold Wiederin, sent the latest drawings by fax. It was metres and metres and metres in one thing. Then the team in Basel would prepare it, show it to Jacques and Pierre, and then, with annotations, send it back again. Nowadays, it is much easier, you can control processes anywhere in the world, and that has to do with the current communication and information technologies. That's an important fact, and that, of course, is part of the digital world. So, I think that the digital was merely a tool which allowed the office to grow in size and work with higher complexity.

This project for the National Stadium of Beijing, you could think this is a result of digital processes, but it is based on a Chinese cord which Ai Wei Wei brought along.

I was leading the competition team, and we had to work on the competition over Christmas and deliver it in a very short time. We had our Christmas dinner, and Pierre told me that he wanted me to be responsible for the competition, and I believe, I remember, that by the end of January we already had to submit the project. So, at the office Christmas party, which was a terrible evening for me, I had to select the team and we suddenly started to work. The first thing we did was analyse the last two Olympic stadiums, in Sydney and Athens. They are, of course, both round stadiums because it serves the track and field competitions, but the main structure in both cases was two large overarching beams. The Athens stadium is by Calatrava, and the one in Sydney by HOK. So, there is a radial figure clashing with

a linear main structure; there can't be a pleasant result. You might solve the problem, but you can make this a great piece of engineering. So, we wanted to have a pure radial structure.

The other thing is that if you design a track and field stadium you get to an oval, but the viewing distance should be the same everywhere. So, if you start with an oval and you start to add the seats for the spectators, you get to a circle at about 80,000 seats, because you want to have fewer ranks on the short sides of the field and more on the long ones. This is a geometric condition.
So, we approached this step by step, track and field oval, adding spectators, good view lines, and we ended up with a circle. Now why should the circle be interfered with by a linear structure, like in the two other stadiums? This was the story we told Ai Wei Wei, who immediately thought of a ball of string, and he brought one along from China as a piece of reference.

The digital wasn't powerful enough at the time, this is why we ended up with a rather traditional structural design, which is not sustainable. But if each element of the structure could be loadbearing, this would result in a very intelligent design, and we could have spared a lot of metal. But at the time the engineers told us that the digital tools were not yet able to do that. They still had to rely on primary elements, which you can easily detect if you study the structure carefully, and secondary elements which were not loadbearing, because the finite method of the calculation didn't allow them to include every single member. This was right at the beginning of this century. Maybe today you could make this structure more intelligent and efficient.

AC: In your opinion, what is the most important design tool in the office?

HG: The models! It is now a while ago that I left the office, but until then, the models definitely. Also the drawing, of course, but what kind of drawings? Sketch, hand drawing, technical drawing, it doesn't matter!

END