Two of a kind

Hofmann Naturstein, a long-established fabricator and installer of high-quality stone facades, collaborated with Frankfurt-based practice TEK TO NIK on two buildings exploiting the potential of digital design and manufacture

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TEK TO NIK
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1. The eight-storey office building FortySeven & Co. flanked by two typical facades from the 1980s
2. The depth of the facade is apparent from the inside
3. FortySeven & Co. has a load-bearing curtain wall focused on a double-height entrance
4. Structural nodes project or recess to create the facade's grid pattern with a striking moiré effect

TEK TO NIK Architects conceived the FortySeven & Co. building whose outstanding natural stone facade has made it a landmark. Set in Frankfurt's banking district and tailor-made for the financial services industry, it has eight storeys totalling about 4,000m² of work space with underground car parking. The design brief specified that each floor should be divisible into separate units ranging from 200 to 800m², and has successfully attracted occupiers from the banking and related sectors.

The facade pioneers new design and construction techniques in Germany. A rational composition focused on the central double-storey entrance, it resembles a chessboard. It has 64 grandly scaled square windows framed by natural limestone components which weigh up to 800 kilograms each. Computerised five-axis CNC machinery milled them into shape by data taken from the architectural model of the building. The entire Mainzer Landstraße frontage works as a highly thermally insulated curtain wall.

Every detail – from the hidden drainage to the precisely calculated effect of the shadows from the sun – resulted from careful thought. For example, each of the four 3-metre-long stone components around every window is angled differently: one vertical leaning out and the other leading in; one horizontal projecting forward to the right, the other to the left. The nodes where they meet alternate between concave and convex, with the resulting composition creating a striking moiré effect.

Viewed from different perspectives, the facade appears to move in a wavelike rhythm, which is a surprising effect given that the total weight of the facade is 116 tons of solid Portuguese limestone.

FortySeven & Co. was completed in the spring of 2015 and won the German Natural Stone Prize for that year. It was also the 'Winning Product' at the Iconic Award 2015.

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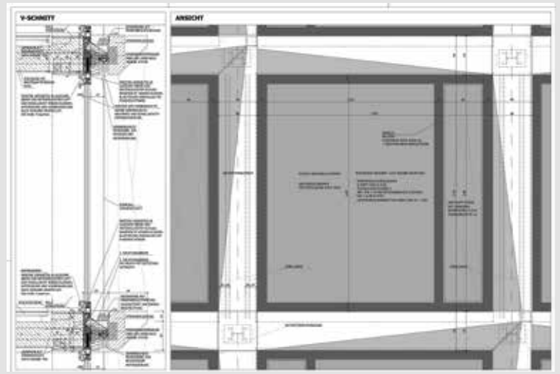

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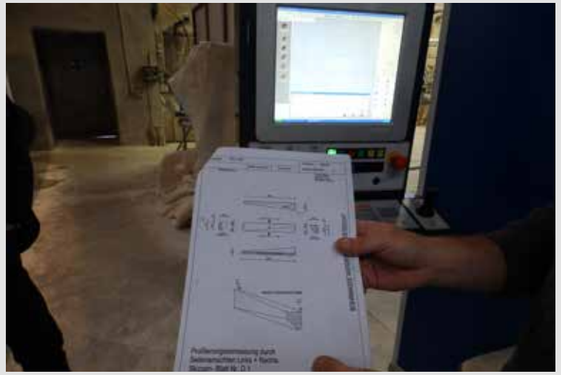

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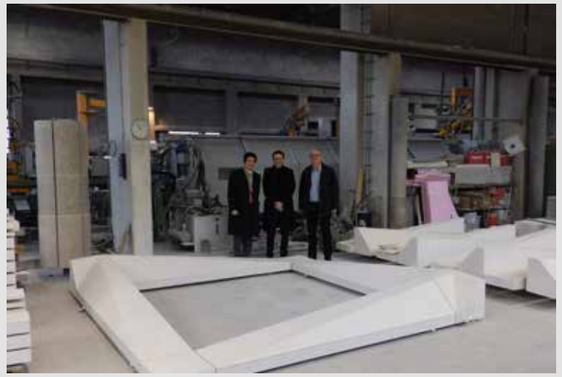

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5. Plan and section of the standard window which is repeated 64 times. The mullions and transoms project up to 400mm and give the facade significant depth
6. The stone, mainly from Hofmann Naturstein's own quarries, is delivered to the factory
7. The raw stone is milled by a five-axis CNC machine tool
8. Data flows from the design model to the milling machine
9. One of the 64 identical windows in the workshop
10. The facade was conceived with ease of assembly on site in mind
11. Installing one of the mullions. The facade weighs 116 tonnes

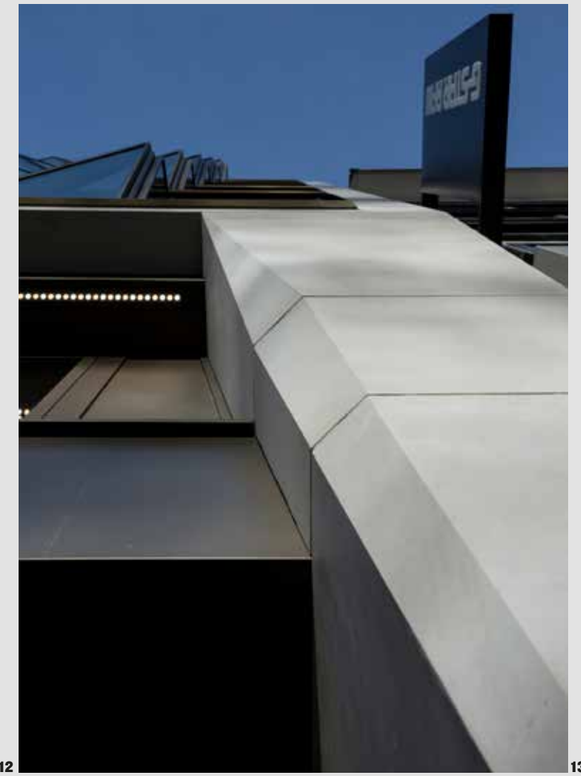
AR interview with Manfred Wenzel (TEK TO NIK FRANKFURT AM MAIN) and Johannes Georg Hofmann (Hofmann Naturstein):

How did your cooperation begin?
MW: The client of FortySeven & Co. did not specifically request a facade made of natural stone. In fact, he interpreted my design as a facade made of precast elements in reinforced concrete. The client did not believe that such a facade could be built in solid natural stone. To realise this unique design and prove its feasibility, I contacted Hofmann Naturstein.
JGH: I met Manfred Wenzel at our company headquarters and showed him our facilities. What interested him most was the five-axis CNC machinery that we use most of the time for replicating historical stone facades.
MW: What fascinated me from the very beginning was the precision and perfection with which the stones were cut. For example, a comparable facade design constructed in reinforced concrete would have been impossible as the slender nodes would not have been able to contain the reinforcement. Milling natural stone requires an even higher level of precision than handling steel.

How did the facade design come about?
MW: We like designing facades with a high degree of three-dimensionality, but we find working with solid and load-bearing materials to be equally fascinating. I enjoy the kind of archaic feeling that emanates from heavy blocks of stone.
The natural stone from Hofmann Naturstein fulfilled all our demands. Hence, we designed the facade with the help of Autodesk 3ds Max as well as Revit and then sent our design to the in-house engineers at Hofmann Naturstein.
JGH: We get most of the natural stone from our own quarries and employ our own engineers to advise architects and clients. With regard to FortySeven & Co. and Zeil 111, we optimised the architectural design from a technical point of view, specifically establishing the maximum weight and dimensions of each block that can be transported and handled on site.

How are the individual stone elements fixed?
JGH: Each facade element from FortySeven & Co. weighs up to 800 kilograms and has a maximum length of 3 metres. At Zeil 111, each piece is nearly 10 tonnes. In both cases, each stone is anchored with a minimum of two stainless-steel pivots at the back.
In total the facade of FortySeven & Co. consists of 50 different natural stone elements, however, the human eye does not detect this variety. The overall impression is that of a homogeneous but textured facade that appeals to the eye.

How long did it take to erect the facade?
MW: It was like putting together a gigantic puzzle. Each stone delivery arrived just in time at the site. Altogether we could have erected the load-bearing facade in three to four weeks, but the site logistics in the city centre of Frankfurt were very demanding. Nevertheless, the precision of our architectural design, and the meticulous execution by Hofmann Naturstein, saved us a great deal of trouble, time and, of course, money.
JGH: Every year we erect around 100 natural stone facades worldwide. Provided the co-operation with the architect and contractor runs smoothly, we are able to work within millimetres as well as the given timeframe and cost limits. This not only supports contemporary architecture but also the environment. We strive to be the world's most sustainable construction material company.



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In Die Zeil, Germany's busiest shopping street, a chemist's shop has occupied a plot only 10 metres wide but 45 metres deep for more than 550 years. This shop, the Hirsch Apotheke, was the origin of the prestigious Else Kröner Fresenius Foundation that still owns the site today.

The outdated postwar building was completely demolished apart from the historic pharmacy, in order to provide 2,500m² for retail, surgeries and micro apartments. To give the site an appropriate architectural identity, TEK TO NIK Architects designed a three-dimensional facade in which protruding natural stone elements as well as the prismatic bay windows generate a strong architectural identity for the building.

The architectural concept draws on the idea of a gateway. The A-frame, made of two natural stone columns each weighing up to 10 tonnes, creates the entrance to the passage which runs through the entire building.

At the other end of the passage, the rear facade has equal architectural value and similar expression to street frontage on Die Zeil with its heavy pedestrian footfall and busy shops. Duplicating the facade on both streets further strengthens and articulates the character of the urban block. The natural stone archway and the prismatic bay window motif bestow Germany's primary shopping street with a unique urban identity.

12. Detail of the gateway on Die Zeil. Each post weighs up to 10 tonnes
13. The gateway spans almost 10m, and leads to the historic Hirsch chemist's shop and the passageway through the building

14. Windows, custom-made to a special design by TEK TO NIK Architects, give Zeil 111 its iconic look

15. The windows project 340mm from the Portuguese limestone
16. Rear view, showing the characteristic portal that marks the entrance to the passageway

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Manfred Wenzel studied architecture in Frankfurt am Main where he received a Dipl-Ing and is a fully qualified architect. Before he set up his own practice he had already worked for other distinguished Frankfurt-based architects such as Christoph Mäckler and Schneider + Schumacher. In 1999, Wenzel founded TEK TO NIK Architects in Frankfurt and has been principal ever since. He is also a member of the Frankfurt City Advisory Board, a member of the DGNB (German Sustainable Building Council) and a member of the Frankfurt Council for Listed Buildings.

TEK TO NIK Architects have ISO 9001 certification by DEKRA and are audited by Sanofi-Aventis.

Hofmann Naturstein,
Werbach-Gamburg

The company was founded 70 years ago and since then has been run by the Hofmann family. It specialises in the supply and installation of complex curtain-wall facades using natural stone. The company offers comprehensive turnkey solutions, all from one source. It handles approximately 100 large-scale projects every year, many for well-known architects and investors.

Its activities include securing deposits of high-grade natural stone and bringing them to market; planning by in-house engineering teams; advanced processing; logistical support; and installation supervision by qualified in-house engineers.

Hofmann Naturstein also provides inspection and maintenance services as well as facade refurbishment to support facilities management.