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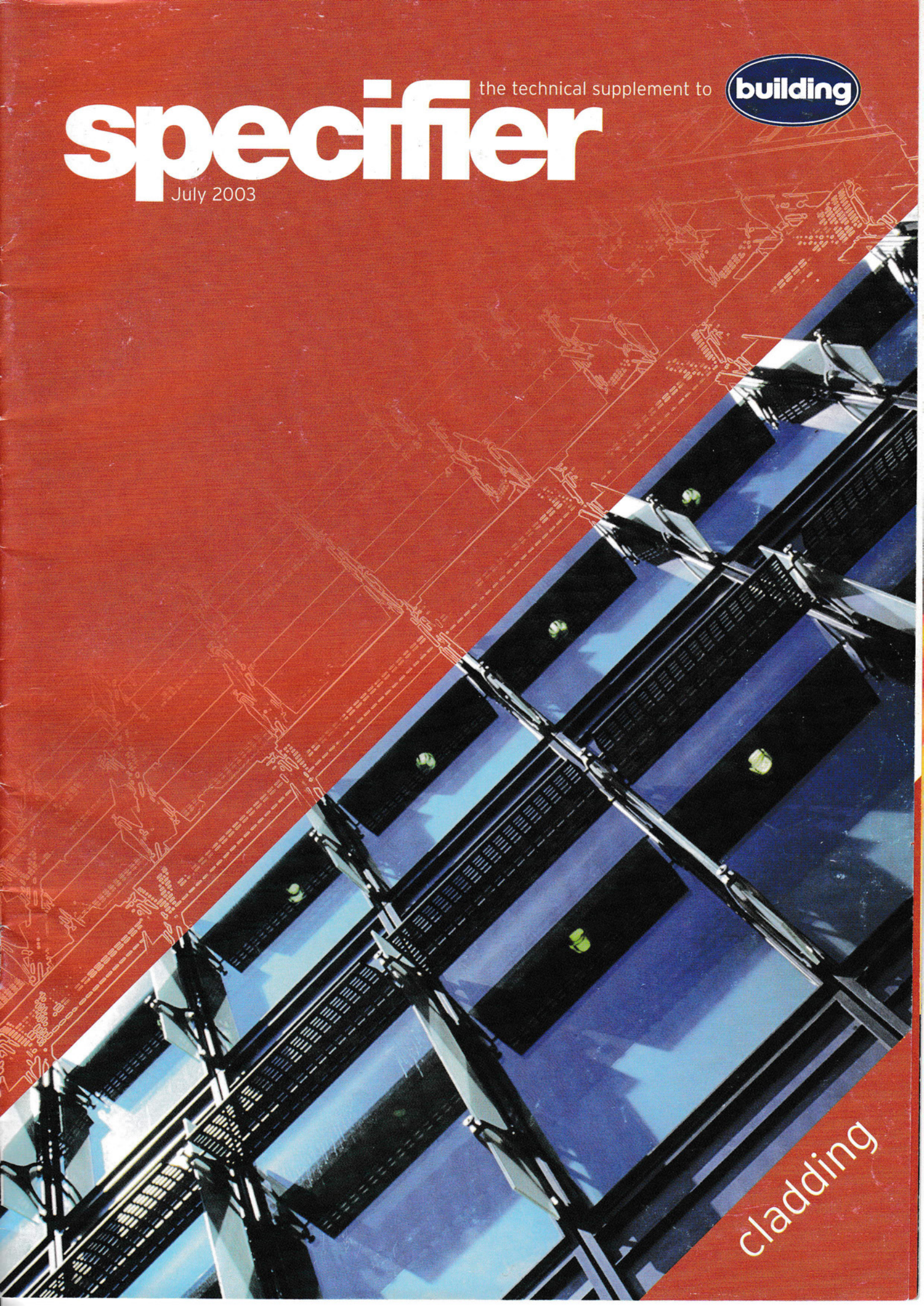
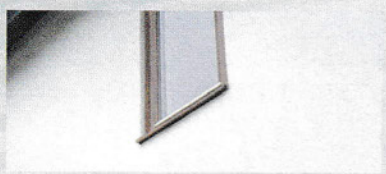


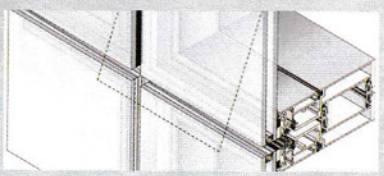
cladding

Glazed and confused

Terracotta glazing is enjoying a revival. It was used extensively at the beginning of the last century, and is proving popular at the start of the 21st. Specifying it is not always straightforward, though, as architect Kohn Pederson Fox found out when it tried to recreate an 80-year-old mottled glaze for a building in the City. Also this month, we examine the performance and lifetime costs of render and check out curtain walling standards emerging from Europe and the Centre for Window and Cladding Technology. Finally, we showcase the latest cladding products to hit the marketplace and look at how green-fingered designers can add plants to their specification without destroying the fabric of the buildings.

Alex Smith, editor, email alex_smith@buildergroup.co.uk





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Tiles of the unexpected

Or how a Kohn Pederson Fox architect with a burning obsession went on the trail of gleaming ceramic facade tiles, and uncovered their secrets with the help of a mysterious, code-cracking stranger ... **Alex Smith** followed the story

Photographs: Angus Fraser

SOMETIMES, A SPECIFICATION READS MORE LIKE A detective story. Take the strange case of Kohn Pedersen Fox architect Richard Taylor, and his search for a distinctive material to clad a prestigious new City of London office building for insurance broker AIG. He knew he wanted something special, but didn't know what it was or how to find it.

After running up a succession of blind alleys, Taylor and his colleagues stumbled on what they were after: a beautiful shimmering ceramic facade on Bury Street, also in the City. The trouble was, it dated from the First World War, and so it was impossible to know who to talk to about the tiles. The building was Holland House, built by Dutch architect Hendrik Petrus Berlarge.

But good architectural detectives makes their own luck. Taylor and his team asked questions: they spoke to the building manager to see if he knew anything about the glazed terracotta panels. They weren't hopeful, as facilities managers generally know about underground car parking and fire alarms, not decorative facades. But Taylor's enquiries paid off – the building manager sang like a canary. Not two months before, someone else had taken a close interest in the facade. The mystery woman had said she was some kind of glazing expert. What's more, she had left an important clue – a business card.

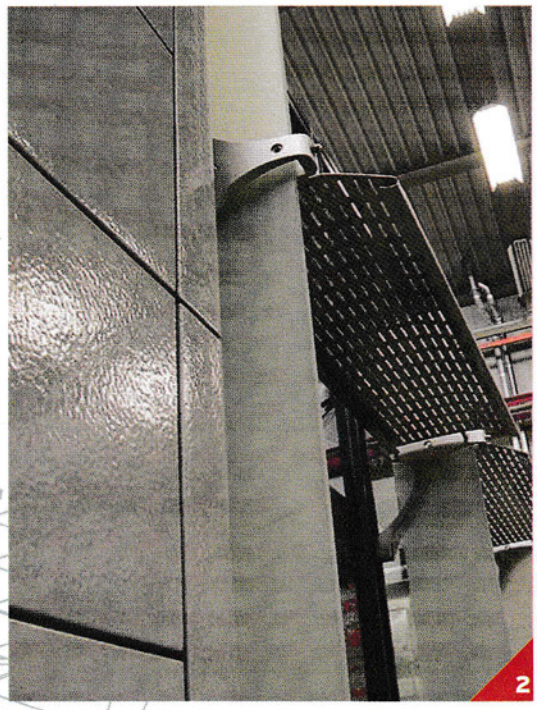
The woman who would help Taylor uncover the secrets of the Holland House glaze was Christine Jetten, a Dutch artist and ceramicist. Through her work as a sculptor, she had built up an in-depth knowledge of the techniques and skills involved in glazing terracotta. Royal Delft had approached Jetten to restore one of its courtyards, which has columns and reliefs featuring a range of its long-lost glazes (see "Enigma", page 10).

Taylor's next step was to phone Jetten and see how much she knew about the Holland House glazing. Luck was on his side: Jetten knew her stuff. She told Taylor the facade's mottled-green glazed ceramic tiles had been supplied by Royal Delft. As it turns out, Delft had asked her to research the glazes created 1910–1920, and her research included visiting Holland House. Taylor and the KPF team had cracked it: through good fortune and perseverance, they had found the one person in the world who could help them with the green glaze.

However, the detective work did not end there, as the Dutch pottery company had few records of any glazes it created before the Second World War. Establishing the tiles' origin was the easy part: the real challenge would be for Jetten to work out exactly how they had been glazed – and then set about recreating them.

Keeping 'em sweet

The project that set Taylor on the trail of the glazed tiles is AIG's new headquarters on Fenchurch Street in the City of London. Taylor and the client were aiming to build a glass building that would offer plenty of light for the AIG insurance brokers. The City of London ▶



Model witness: Working out the metal

Having gone to so much trouble specifying the glazed ceramic facade, Richard Taylor was keen that it would not be compromised by the appearance of the metalwork. A single-storey mock-up of a corner of the building was erected in Holland by Scheldebouw, the main supplier of the curtain walling. It included a glazed terracotta pier, two bays of glazed panels, glazed fins, two bays of glass fins and the stainless steel brise soleil and enabled Taylor to select an appropriate metalwork colour to complement the glazed terracotta.

"The metalwork can make or break a project," says Taylor. "With the mock-up we were able to fine-tune the colour. It was originally black but when on the mock-up it was draining colour from the building."

KPF eventually selected uranium grey for the curtain walling frame and spandrel. The neutral colours of the glass and stainless steel used on the brise soleil and fins had no impact on the facade and were predetermined before the mock-up was built.

KPF produced another mock-up of a bay with Arup Facade Engineering to help determine the detailed design and interfaces between the frames, fins, brise soleil, and wishbone-shaped brackets.

▶ planners were happy with this, but were also keen for the facades to have a degree of solidity to reflect the Portland stone used in much of the Square Mile.

Rather than specifying stone cladding, Taylor wanted a material that would offer more reflectance. "We wanted to lessen the impact of the building and give it a lighter touch," he explained - an understandable goal, given the building is so large. It steps up to 15 storeys and occupies a whole block in the heart of the City. When Taylor presented a sample glazed panel to the planners and explained that Holland House was the inspiration, he met with a positive response.

Taylor had asked Jetten if she could recreate a glaze similar to that specified by the original architect, Hendrik Berlarge, and given her unglazed terracotta samples from three ceramic suppliers. After testing the samples, Jetten concluded that Dutch manufacturer NBK would be the company most capable of working with her glaze recipes.

A stab in the dark

But the project team was taking something of a leap into the unknown. Jetten had not worked with a large manufacturer before, and the production process differed wildly from that used 90 years ago. The Royal Delft kilns were fired with wood and then coal and the tiles handmade. NBK, on the other hand, uses electronically controlled kilns and has a production process that manufactures batches of perfectly uniform tiles with no variation in texture or tone.

The challenge for Jetten was to recreate the nuances of the handmade tiles on modern equipment. "You could have made the tiles by hand, but with such a large amount of cladding required it would have been too expensive and a hell of a job to execute," says Jetten. The handmade method would also have created too much variation between each panel. The trick was to create a constant variation in texture, so that there would be a uniform colour and tone across the facade.

To produce controlled variations on the production line, Jetten worked with NBK's lab for several months testing recipes. There were also other variables to consider, such as the size of particles in the clay, the source of components such as quartz in the glaze and the time taken to fire the clay. The rate at which the ▶

1 The glass fins and brises soleil were bolted on site on to the panels, which were prefabricated by Scheldebouw.

2 A mock-up was created that enabled KPF to specify the background colour that best complemented the glazed terracotta.

3 The black granite piers are similar to those at Holland House.

4 The glass boxes give office workers floor-to ceiling views of Tower Bridge.

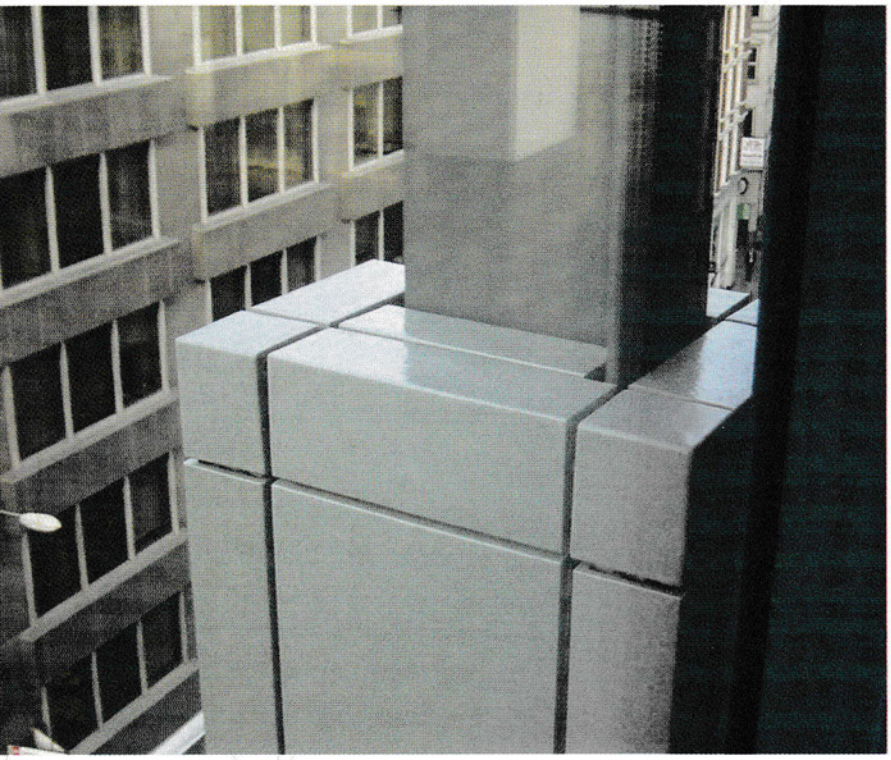
Facade fatale: Solving the glass panel problem

The south elevation features two large twin-skin glass boxes. The glass panels used in the facade are larger than those specified on other elevations because KPF wanted to offer tenants the best possible views of the River Thames and Tower of London. But the specification of the large 3.7 m x 3 m glass panes was not straightforward. Glass panels of that size are too big to be toughened on a production line so ordinary annealed glass had to be specified for the double-glazed panel. The cladding supplier Scheldebouw calculated how thick the annealed glass would have to be to withstand the wind loads: toughened glass would have been much thinner.

The inner layer of single glass could be toughened because the panel is split into two sliding panes and were small enough to be worked on in the factory. The sliding panes allow easy access to the glazing cavity for cleaning and maintenance of the louvres, which provide an element of solar shading.

The final design differed from the initial design drawn up by Arup Facade Engineering and KPF. Originally the single glazing was on the exterior of the facade and the double glazing on the interior. The idea was to create a four-storey stack effect in the cavity between the glass panes. Vents would have been situated on the exterior to allow air to enter and leave the building. But there was a problem. When Arup and Scheldebouw independently analysed the design they both found that the temperature inside the cavity was too high. There was also a concern about flames and smoke moving between floors in the event of a fire.

The answer was to self-contain the ventilation on each floor and seal the outer skin of the facade. The design had air moving up the inside of the window and into the ceiling plenum on each floor. Not only was the revised design deemed safer and more efficient than the original but it also improved the sound insulation because there were no longer any penetrations through the facade. The air comes into the building through vents in a curtain wall on the other side of the building.

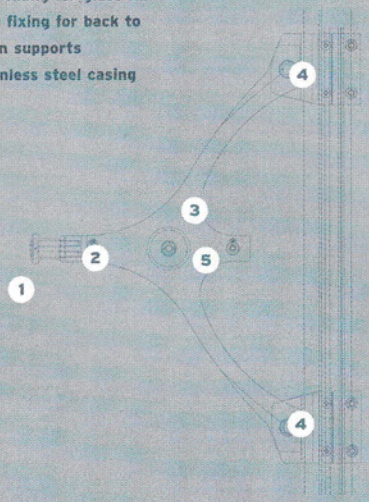


The 3D glazed terracotta elements were the most difficult to manufacture.

Same but different: The cladding frames

The brises soleil and fins providing solar shading are secured to the mullion by brackets designed by KPF.

1 Button for cleaning cradle to engage facade
2 Support point for brise soleil
3 Bolt fixing for glass fin
4 Bolt fixing for back to mullion supports
5 Stainless steel casing



Enigma: The secret of the glaze

Before the Second World War, Royal Delft went to extraordinary lengths to ensure that its glazing recipes did not fall into the hands of its rivals. The technicians used secret codes when they formulated their recipes: not even factory workers on the shop floor knew what ingredients were being used for each glaze.

Jetten had managed to acquire some of the encrypted recipes from Delft. Some of the letters were easy to decipher such as A for clay, which appeared in large quantities in every recipe. Other letters were more problematic and did not appear to follow any patterns.

In her effort to crack the code, Jetten got in touch with ex-factory worker Arie Huisman through the company's pension fund. Although he was not responsible for producing the glazes, he had been as fascinated in the secret ingredients 60 years ago as Jetten. Huisman told Jetten what he remembered of the recipes and was also able to help her decipher the code, as he recognised that some of the letters were the initials of people who had worked in the laboratory.

"He is a constant source of information," says Jetten. "When he remembers something else, he rings me up." With his help, Jetten is gradually piecing together Royal Delft's lost recipes. "They are useful for restoration work and they have given me great insight and understanding into how glazes are created," says Jetten.

Her attempt to recover old recipes has also made Jetten very open about what her own recipe mixes: for a start, she doesn't write them in a strange code and she is happy to tell more architects and manufacturers about the secret art of terracotta glazing.

Project team

Architect Kohn Pedersen Fox
Main contractor Mowlem Major & Special Projects
Structural engineer Connell Mott MacDonald
Facade engineer Arup Facade Engineering
Mechanical and electrical engineer Flack + Kurtz
Cost consultant Gleeds
Ceramic consultant Christine Jetten, Labyrinthus
jetten@labyrinthus.demon.nl

Suppliers

Curtain walling and envelope contractor Scheldebouw
www.scheldebouw.com
Glazed terracotta NBK
www.nbk.de
Cleaning cradle NIM Suspended Access, LGH
www.lgh.co.uk

▶ glaze is applied also determines the terracotta's appearance: Jetten arranged for the glaze to be poured at intervals on the production line to achieve the desired finish.

The architect would not have been able to glaze the 3D cladding elements such as fins and corner sections without Jetten's expertise. The problem with glazing 3D objects is that imperfections in the glazed surface can be caused by organic materials in the clay exploding during firing. For 2D elements glazed on a flat rolling kiln, it's not a problem because gravity returns the molten clay to its original form. But by varying the production process, Jetten was able to produce glazed 3D elements free of imperfections.

Case closed

Taylor was delighted with the result of the collaboration, which delivered exactly the colour, tone and mottled ceramic finish he was after. So pleased in fact, that the other cladding elements were specified around the glazed ceramic panels (see "Model witness", page 8). "The glazed terracotta was key to determining the appearance of the rest of the building," says Taylor.

The resulting building is a handsome combination of ceramic cladding, grey metal and curtain walling. KPF has incorporated sleek terracotta and steel fins in the facade design, which gives the building a much livelier and interesting appearance than its City neighbours. From an angle, the fins also give the building the solid appearance that the City of London was so keen on. On the south face is another variation in the facade. Two large glass boxes offer outstanding views to the River Thames and Tower Bridge. These posed another design and specification challenge to KPF and the cladding engineer Arup (see "Facade fatale", page 9).

For Christine Jetten, her chance trip to Holland House may have led her into a whole new career. She is now working on an apartment block near Hyde Park, and Taylor has put her in touch with KPF's office in New York, which needs her advice on a new project in Beijing. For Jetten and KPF the detective work may have only just begun.