



## Case study

### Moorgate Exchange, London

**End client:** Telex Sarl

**Architect:** HKR Architects

**Principal contractor:** Skanska

**Structural engineer:** Ramboll

**Steelwork contractor:** Severfield (UK) Ltd

**Product:** Celsius® 355 Circular Hollow Section

**Year:** 2014

Completed in the spring of 2014, Moorgate Exchange is a 12-storey office building constructed on the site of the City of London's old telephone exchange. Maximisation of internal space was a key driver in the development of the building. Tata Steel's hot-finished Celsius® 355 Circular Hollow Section (CHS) – utilised as internal and perimeter columns - played a big part in realising this ambition.

Tata Steel's Firesoft design software was used to produce an innovative composite column design. This ensured Celsius® 355 delivered the required strength and fire performance whilst reducing the size of the perimeter columns. The novel design removed the need

for an intumescent coating on the columns. Coupled with the excellent steel surface finish, this allowed application of a sleek architectural coating.



# COMPOSITE COLUMN DESIGN CREATES SPACE

## The requirement

Maximisation of commercial space was a key requirement in development of the Moorgate Exchange office complex. This posed an interesting challenge for structural engineers, Ramboll.

To realise the architect's vision for the building it was vital that perimeter columns did not detract from the sleek glass façade when viewed from outside. Internal aesthetics were also important in this premium development – underlining the need for a smooth and unobtrusive finish to columns visible on each floor. Efficient use of steel material and ease of construction were among other important considerations.

**“It was obviously important to the client to have as much flexible internal space as possible, the challenge for us was to design with as few columns as possible and to make these columns as small as possible.”**

Said Alex Baalham, Project Director at Ramboll.



## The solution

Detailed design and analysis enabled Ramboll to minimise the use of internal columns – achieving 16.5 m spans of flexible office space.

Close collaboration between Ramboll, steelwork contractor Severfield (UK) Ltd and Tata Steel, delivered a cutting-edge solution for the columns. Using Tata Steel's Firesoft design software, composite columns were designed to Eurocode 4 and the UK National Annex. The design, utilising hot-finished Celsius® 355 CHS filled with reinforced concrete, enabled columns to be reduced in size and removed the need for intumescent coating and column encasement.

The novel composite design allowed 457 mm diameter Celsius® 355 sections to be used at 7.5 m centres around the perimeter of each floor. “The perimeter columns would have been 610 mm CHS sections if we'd taken the traditional route to designing out the intumescent coating,” said Alex Baalham. “The columns are also far less visually intrusive – your eye is drawn to the building façade rather than the columns.” Internal columns on the ground floor were produced using 508 mm diameter Celsius® 355. The reduced column size freed up more space within the building which offers more than 20,000 m<sup>2</sup> of floor space over 12 storeys.

The quality of surface finish on the sections also provided benefits. Tata Steel's ongoing investment in manufacturing processes is delivering a reliably consistent finish on Celsius® 355 products. An excellent surface on the Celsius® 355 used at Moorgate Exchange provided the perfect base for the architectural coating used on the columns. Without an intumescent coating – which can produce an 'orange peel' effect - the columns have a smooth finish in keeping with the building's high-spec interior.

Stubs welded to the sections enabled fast and efficient connection of the columns on site.





#### Tata Steel products:

Celsius® 355 is a hot-finished hollow section suitable for all construction and mechanical applications – performing reliably in even the most arduous conditions. With a minimum strength of 355 MPa, it allows the highest fabrication factors and enables material cost savings and lighter structures. Available in a wide range of circular, square, rectangular and elliptical hollow sections, Celsius® 355 offers dimensional consistency, high levels of formability and excellent weldability. Celsius® 355 products are traceable, CE-marked and fully compliant with the Construction Products Directive.

#### Contact us:

For technical advice on the application of Celsius® 355 for your project – or to discuss the benefits of Tata Steel's Firesoft design software – please contact our Customer Technical Services Team.

### Project success

"This was a very successful building project. It displayed an exciting new approach to column design and the architect and client are both very pleased with the results," said Alex Baalham. "The Tata Steel team added value in the column design process – helping with preliminary designs and talking through technical points."

Paul Watson led Tata Steel's Customer Technical Services Team in support of the project. He said: "This project is a great example of the benefits of structural hollow section used as columns. It's the most efficient section in compression - offering savings on material costs – and it lends itself to very simple, cost-effective connections. Filling it with concrete enables reduced external fire protection, revealing an excellent surface finish that means it's aesthetically pleasing."

"Moorgate Exchange represents an exciting departure for Celsius® 355. The use of composite beams is well-established – but it's less common to see composite column design used as it has been here." Paul Watson, Customer Technical Services Team, Tata Steel.

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