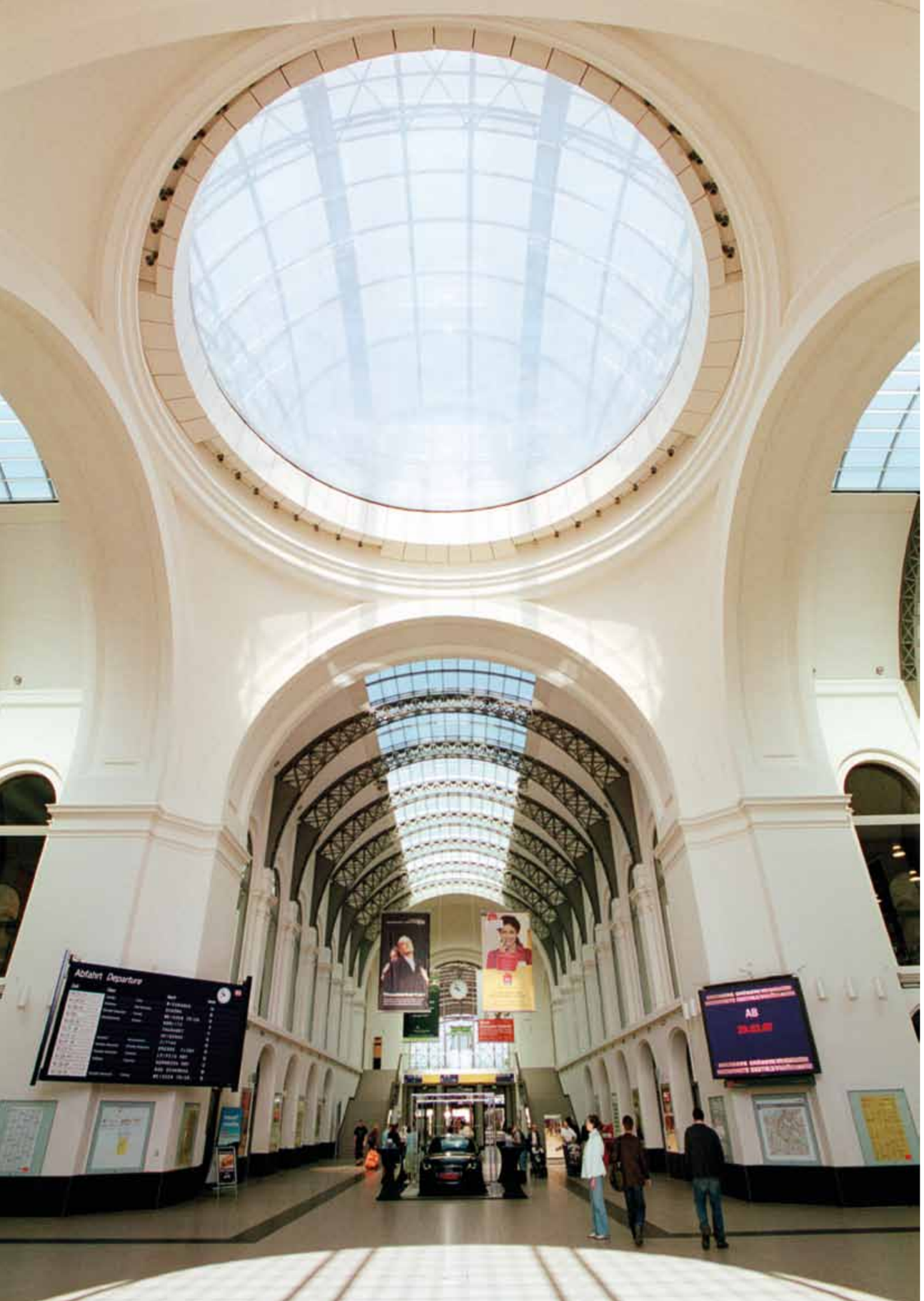
Central Station Dresden

General renovation and reconstruction of the station building

SSF Ingenieure



Picture credits: Ulrich Windolffer

General renovation and reconstruction of the station building of the historic Central Station in Dresden built in 1895, was an urgent need after the floods from 2002 in order to assure the building's stability and keep it operable.

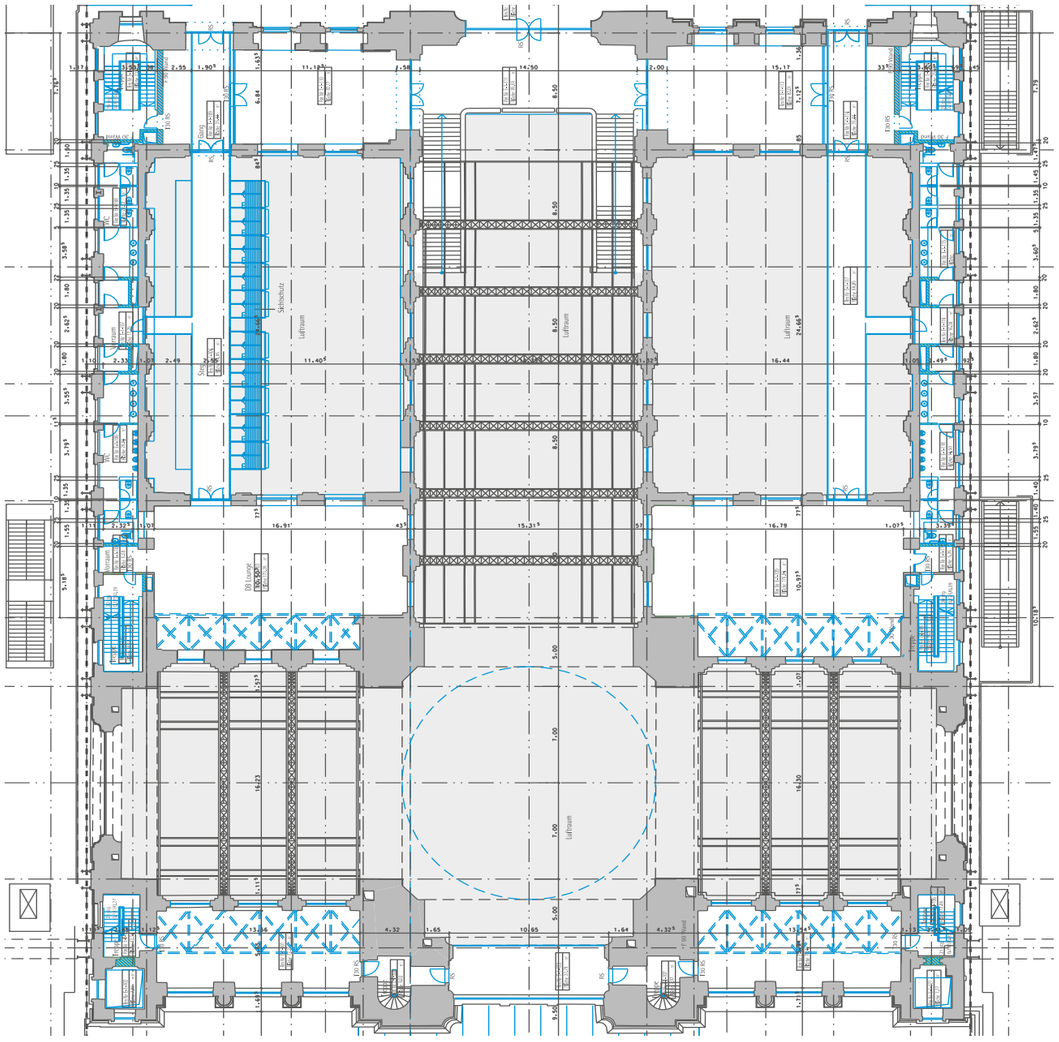
Building description

Dresden Central Station was built between 1892 and 1898 based on the design of architects Giese und Weidner and is, after Leipzig and Berlin, the third largest station in East Germany. Moreover, it is one of the most impressive train station buildings of the late 1900s in Europe. During the Second World War it was heavily damaged and some areas were completely destroyed. During reconstruction after the War, damages on the building were only in parts subject to durable renovation so that in some areas of the station provisional arrangements and simple facings of destroyed sections still remained.

The station building of Dresden Central Station with a basement underneath the whole structure, is a rectangular solid construction developed in longitudinal and transversal direction above the

left: Demolition south waiting hall
right: Demolition basement at passenger area

Data and Facts	
Client	DB Station&Service AG
Architect	Foster & Partners, London
General Planning	SSF Ingenieure GmbH, Munich
	Services according to German Scale of Fees for Services by Architects and Engineers (HOAI)
	Project planning for buildings, open-air facilities and room-creating interior works
	Project planning
	Structural engineering including all construction stages under ongoing operation, makeshift constructions and mounting technologies, Structural inspection including as-built documents
	Performance related to plant outfitting
Work phases 1 to 8 for all above mentioned services	1 basic evaluation, 2 preliminary design, 3 draft design, 4 approval design, 5 final design, 6 preparation of tenders, 7 evaluation of tenders, 8 supervision Construction physiques (phases 1 – 5) Subsoil assessment (phases 1 to 3)
Floor space	4,000 m²
Total length/width	approx. 67 m/60 m
Height	approx. 35 m
Gross floor area	13,925 m^2



ground plan station building

1

Picture credit: SSF Ingenieure GmbH

Picture credits: **1+2** Ulrich Windöfer

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continuous basement ceiling by two central passages. In the area where the two passages overlap each other a steel dome with square ground plan towers above the building.
The external dimensions of the station building are 76 meters in longitudinal and approximately 59 meters in transversal direction. The passages have a clear width of approximately 15 meters resulting in a surface of 15x15 meters for the dome. The building is 18 to 20 meters high from the upper edge of the basement ceiling. The dome is about 35 meters high.
Roofing of the passages was made of brick barrel vaults in the entry areas, and steel truss arches in the intermediate sections. Along the exterior walls, two external cores serve as stiffening. These four-storey building cores are stiffened by several dividing walls and ceilings and are limited by the load bearing longitudinal interior walls as well as two masonry pillars at the building's corners to the platform halls. Inside the building, on the north as well as the south side, two smaller halls and two halls reaching up to the ceiling are arranged, all of them on the first floor.

1 **View façade** east with platform halls adjoining from both sides
2 **Interior view façade** west with apron of middle hall

Renovation concept
Reconstruction took place with consideration of modern, technical, building-physical, fire-protection and building-technical aspects in order to achieve optimum serviceability of the station building in view of ideal handling of passenger flows, administration facilities of the Railway Company as well as installation of advertising spaces. For this, the building core was completely removed and not reutilized for load transfer of necessary construction elements. Authentic elements within the building were preserved and renovated including the building foundations. Constructional elements which were assembled after the War were removed and replaced by modern material, in up-to-date construction methods.

Interior view dome truss

Ceiling trusses
The existing ceiling trusses including the whole basement ceiling were removed because of their insufficient load-bearing capacity and because of their damages as well as the non-present fire resistance; they were replaced by reinforced concrete flanges and reinforced concrete ceilings. To assure an optimum serviceability of the basement utilized as technique and service area for marketing installations, the basement ceiling was realized as joistless flat slab with regard to the present height between floors. Bearing points were arranged at the edges in linear form in the natural stone walls and as point bearings in the intermediate areas on reinforced concrete round supports.

Dome
The primary steel truss, supported on the central masonry arches of the station hall, was renovated in-situ and a new corrosion protection layer was applied. The glassing of the historic dome truss was, analogous to the membrane roof of the platform halls, assembled to the truss members of the primary truss by installation of a statically and geometrically connecting spatial secondary steel substructure. To achieve a high grade of prefabrication with regard to the existing tolerances of the primary truss, a high degree of detailing was necessary during final design of the spatial steel substructure as well as the connections of the glassing.

Detail dome truss with maintenance catwalk

Picture credits: Ulrich Windolffer

View on the roof station building with adjoining middle hall

Masonry

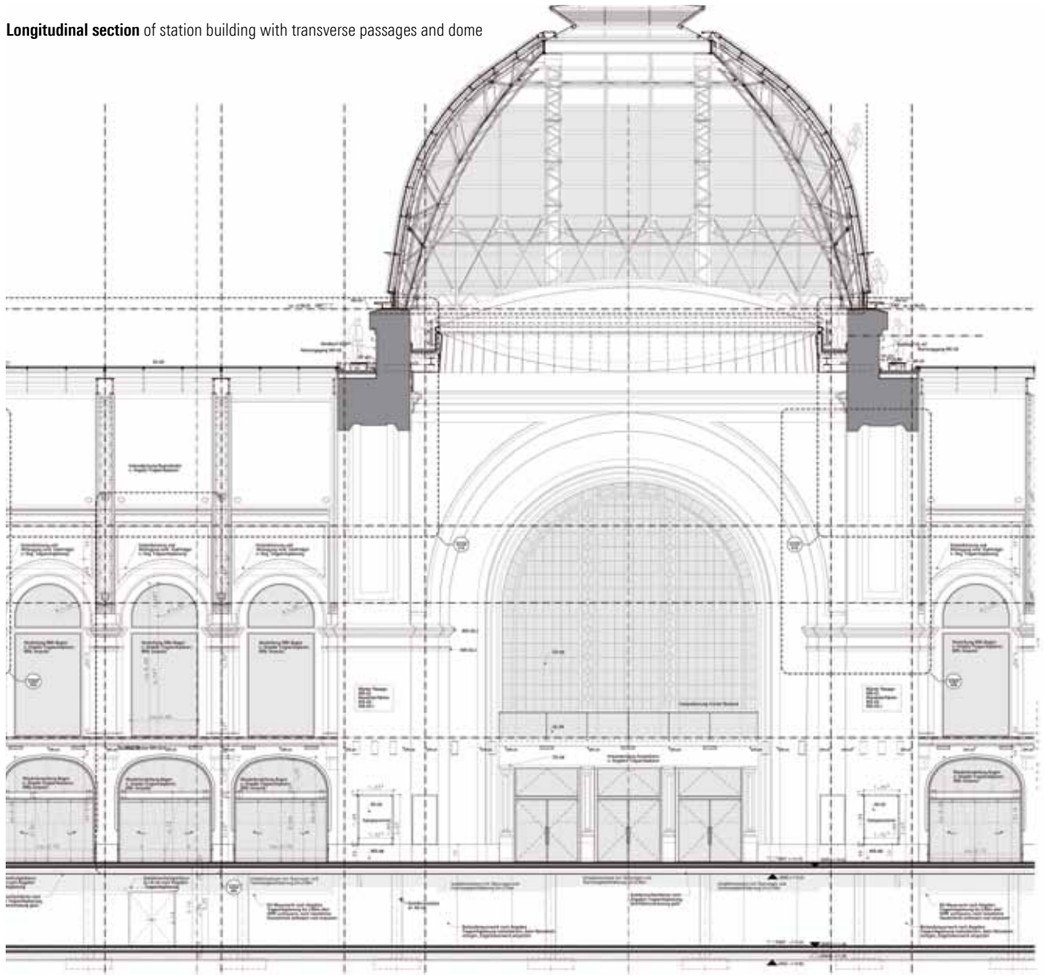
The interior masonry was heavily damaged during World War II and was structurally renovated and in some areas renewed in accordance with the whole system and with respect to monument preservation.

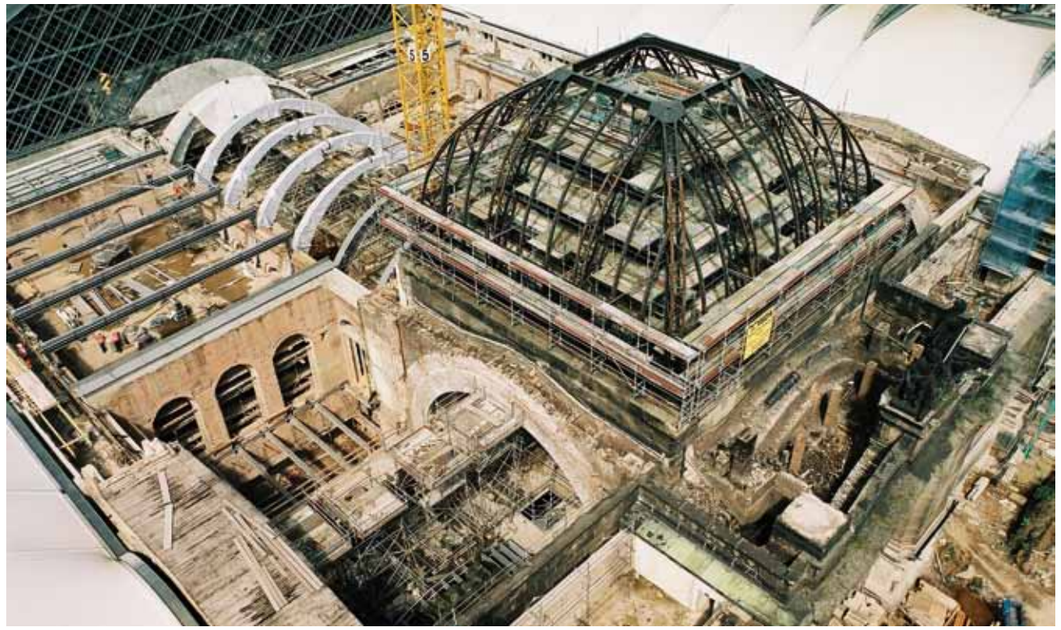
The exterior mixed masonry of the station hall with natural stone facing and brick masonry back-up was hugely damaged and cracked by fire loads during air raids in the Second World War. Under consideration of horizontal loads, to be absorbed from the adjoining and connected membrane truss of the stations roofs, the roofs were renovated and joined to the new reinforced concrete roof trusses.

Clocktowers

The clock towers which were largely removed during renovation works in the 1960s, were rebuilt according to the original architectural design.

Longitudinal section of station building with transverse passages and dome





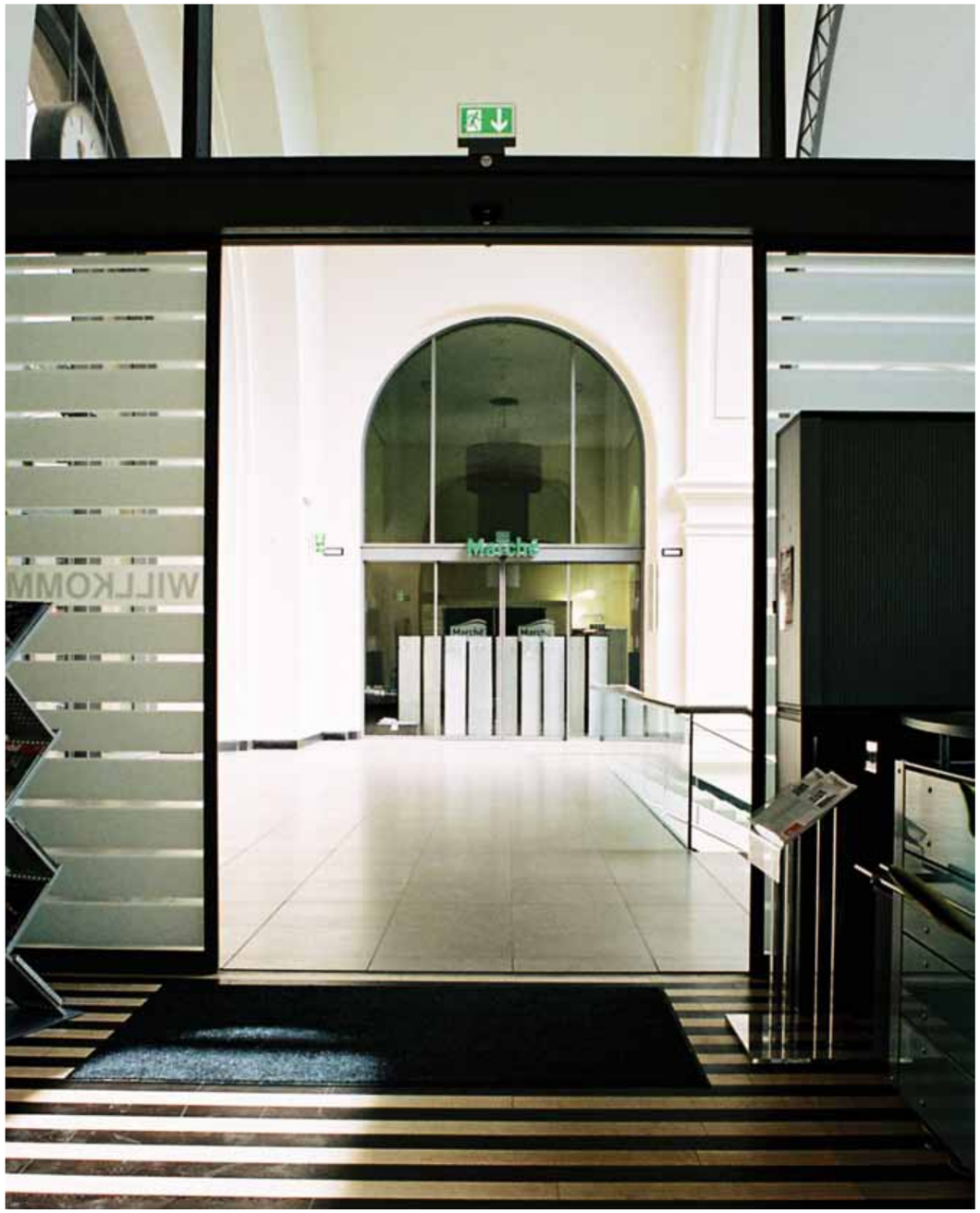
Construction stage station building

View east station building with adjoining platform halls

Picture credit: Foster & Partners, London

Picture credits: Ulrich Windolffer

Entry area DB Lounge



Roof truss general

Wood and makeshift roofs, mounted continuously during post-war renovation because of huge fire damages due to air raids in the War, were removed and covered with new large-span roof trusses.

Passage roofs

The steel truss arches of the passage roofs were completely taken out, damages assessed and then renovated in the workshop. The new passage roofs are formed on both sides at the edges as light metal insulated roofs with suspended, radial plasterboard facings and in the middle areas with a structural glazing skylight.

Roofing of the old large waiting halls

The destroyed historical roof trusses were replaced by wide-spanning shed-glass roofs with steel substructure and glass dimensions of 4.70 x 2.10 m.

Longitudinal passage

Detailed knot canopy

View from the DB Lounge to the middle platform hall

Picture credits: Ulrich Windoffer

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