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Sergej Ryklin - Born in 1963 in Moscow

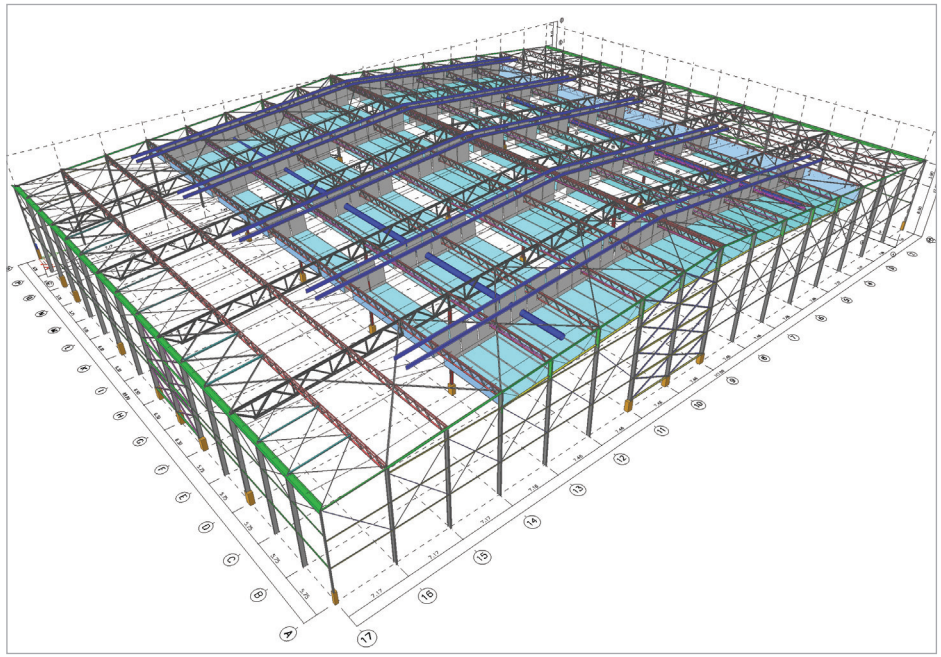
- 1981-1985: Civil Engineering; "Bridges/ Tunnels"
- Since 1993: Structural designer and verifier by "Römhild & Hecker" Consulting Engineers in Landau, Germany
- Since 1997: Structural designer
- 2008-2009: Master Study on the Institute for Membrane and Shell Technologies, Anhalt University of Applied Sciences, Germany

Range of Capacity: Planning and optimization of Steel, Aluminium, Solid, Composite, Timber and Membrane Structures, Project consultancy, Building physics calculations, Dynamics calculations, Project verification.

Philosophy: Flexibility in planning due to integral 3D Design with the ability to find feasible and low-cost solutions already in draft stage.

Experience: Residential and industrial buildings, parking spaces, pedestrian bridges, swimming pools, silos, membranes, etc.

References: Daimler, John Deere, SAP, DB, etc.



Software: Scia Engineer

Fire Protection Ceiling for Storage Hall - Hamburg, Germany

Customer

HHLA - Hamburger Hafen und Logistik AG has decisively shaped Hamburg's rise to become one of the world economy's most important hubs. With innovative terminals, an ecologically exemplary transport network and comprehensive logistic services, today it stands for the intermeshing of global goods streams between Europe and overseas.

HHLA was founded as HFLG in 1885 to develop and run Speicherstadt (Warehouse District) of Hamburg. This was designed as the largest, most modern logistic centre in the world, and even at that time it was optimally intermeshed with networks of different carriers (sea, rail, and road). HHLA offers its clients an immense range of services along the entire logistics chain, from the quay wall in the overseas port to its customers in the hinterland.

The order

A big existing storage hall from the middle 80's was indicated as a temporary storage place for the oncoming parts for the production of the Airbus. Due to the modern rules for fire protection the inner space of the hall has to be reduced to ensure the functionality of the sprinklers.

Because the statics of the hall did not consider the possibility of the additional load (about 30 kg/m^2 required for the conventional solution with fire resistant plates), the client was looking for alternatives.
A membrane ceiling with a fire resistance glass fabric spanned over the prestressed cable network was suggested. The additional load was assumed to be 1.0 kg/m^2.

Technical data

The existing hall consists of a filigree crossed steel framework beam roof with paired girder elements. The roof bases on the inner and outer facade steel columns net. The roof and side wall bracing stabilized the structure. The existing dimensions of the inner storage space were about 90.0 x 117.0 x 18.0 m. Due to the fire resistance rules, the required height of the storage hall has to be lower than 15.0 m.
About 12.000 m^2 fabric material and 6.000 m cables were needed. The biggest challenge was to consider the existing roof geometry with all structural and additional elements such as 5 bands of light across the whole roof, existing old sprinklers and ventilation tubes, differently placed bracing, stability cables and truss elements. The new ceiling was not allowed to have more than 3% openings!

Software and model

Scia Engineer was used for the processing of the whole project. The original execution plans were not found, but after very detailed surveying of all main parts of the structure the hall was completely build up as a 3D Model and the required geometry of the ceiling was settled. To optimize the fabrication and montage the ceiling was divided on the strips with two different widths due to the fabric production geometry. According to the settled strips the cable net with required additional facade beams, anchors and intermediate connections were planned.

Calculation and production

The calculation, design and optimisation of the cable structure with the required additional facade beams was made according to the IIIrd order theory. The deflection of the ceiling has to be limited to 20 cm. Verification of the existing facade columns with additional load from the ceiling was done too. The next steps were the design of the connections for the new structure. At least design and confectioning of the fabric strips with connections to the cable net and to the existing structure was processed.

Execution

The structure was completely planned und produced in 3 months. The General Constructor was Planex Technik in Textil GmbH. Nevertheless the optimisation, about 280 different types of fabric stripes were derived from the 3D model due to geometrical demands. The total project cost amounted to approximately 370.000 Euros.

Fire Protection Ceiling for Storage Hall

Hamburg, Germany

Project information

Owner	HHLA Hamburg
Architect	Dipl.-Ing. T. Beyer / Dipl.-Ing. S.Ryklin
General Contractor	Fa. Planex Technik in Textil GmbH
Engineering Office	Dipl.-Ing. S.Ryklin STATIK
Construction Period	From April 2009 to July 2009
Location	Hamburg, Germany

Short project description

The presented project is about the ceiling renovation of a storage hall for Airbus parts of the 80's in accordance with the modern rules for fire protection. The inner space of the hall is reduced, the membrane ceiling is provided with a fire resistant glass fabric spanned over a prestressed cable network and the height had to be lower than 15 m. About 12.000 m² of fabric material and 6.000 m of cables were needed. The biggest challenge was to consider the existing roof geometry with all elements such as 5 bands of light across the whole roof, sprinklers and ventilation tubes, differently placed bracing, stability cables and truss elements.