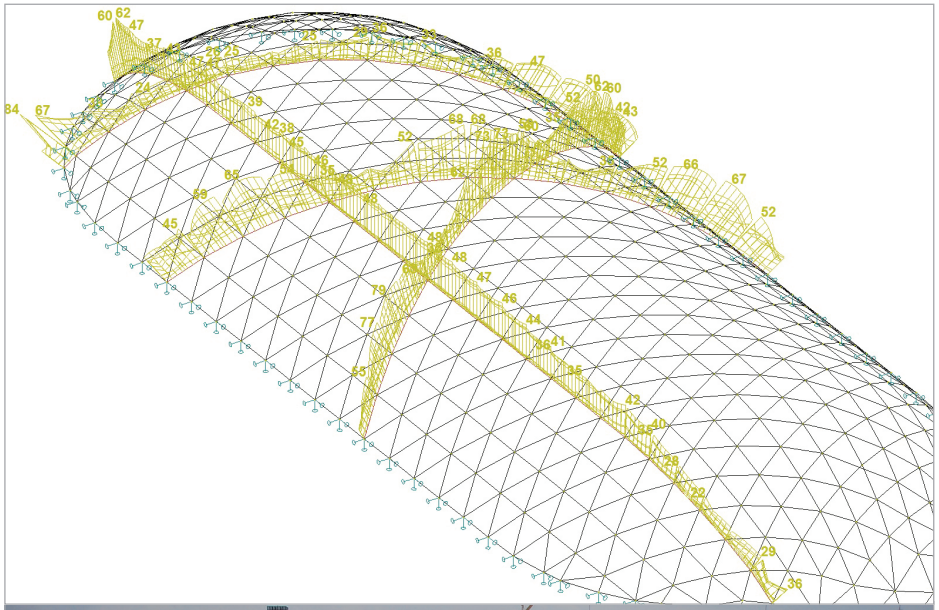
Bank of Moscow - Moscow, Russia



Software: Scia Engineer

Introduction

The Bank of Moscow desires a building in Moscow with a complete glass skylight and a big glass façade above a concrete structure.
The skylight measures approximately 16 m x 38 m, while the height of the façade is +/-25 m. The structure has to be very transparent, thus minimising it. The glass of the roof is heated to prevent any snow from settling. The glass of the façade is fire-resistant glass.

Task

We were asked to calculate the design for a very thin structure with glass panels on top for the skylight and the façade.
We designed a structure with square tubes as beams. In order to fit the cables of the heating system for the glass panels, we designed holes in the square tubes. The crossings of the beams are round tubes, so the tubes could be connected by welding.
In collaboration with Pauwels Glassprojects and our Russian client, the contractor Poits, we designed a system that works like meccano. The idea was that there would be no (or much less) measuring on-site and in the production factory to avoid mistakes and to speed up the production time as well as the time for the erection.
So we made the tubes with small protrusions and the round tubes with cut-outs to fit into each other. We designed this system in a way that meant the orientation of the beam could not be mistaken. If turned around, the beam would not fit into the cut-outs of the tube.
The cut-outs of the tube were also designed so that they could not be turned. When some elements are assembled together, the next beam has to glide in from the top. To ensure they could glide in from the top, some beams had protrusions on top that fit into the cutouts on top of the tubes. This way the beams and the tubes could be put together without mistake. Since we made the construction drawings ourselves, and the tubes and beams were cut by laser-cutting, we gained full control of this and there was a perfect fit.
That was the initial part. In the second part, we designed for each section that was transportable (half of the width of the skylight and about 3 m in its expanse) a caliber so that when the elements were put together the position and the angles were 100% correct without any required measuring.
In the main section (a metric tonne), the calibers could be used for several parts, at the edges, and for the façade the calibers could be used for just for one part.
To avoid measuring (and mistakes in measuring) during the process of assembling and welding, the calibers were also made with cut-outs and protrusions.
The whole system worked perfectly and the precision and the erection time on-site were fabulous.
Both the glass panels and the aluminium and rubber parts were designed together with the drawings.
This rendered the taking of measurements on-site unnecessary. Exactitude in the sizes of the glass panels was achieved by drawing.

Application Scia Engineer

The calculation of the stresses in the profiles and the displacements were carried out with Scia Engineer. As the shape of the skylight is a circular part that comes close to a reverse cable line, the forces in the beams are mainly normal forces. But because a circular part is not a cable line, and because of the asymmetric wind loads, there are moments in the beams and crossings. This requires a 3D-model, for which Scia Engineer was very useful.
We also used a separate 3D model in Scia Engineer to calculate the stresses and deformations of the pre-welded parts when hung on the crane during the erection and to define the points of leverage.
The calculation of the glass panels was also performed with Scia Engineer with the plate-module.

Stabilogics

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Stabilogics is an engineering bureau with great experience in stability-calculations.
Since its foundation in 2000 we are growing and are now a team of 13 people. This makes us very flexible and able to anticipate very fast what the best solution for requested projects is. With this team of experts we are also able to design and calculate very big projects. We have experience all over the world and are able to produce designs in accordance with most standards and codes: Eurocode, with all European national annexes, British standards and others. We have always put the execution of the building as the top priority. We work from design to execution, producing workshop-drawings of steel- and concrete-structures. To avoid problems on the building-site we ensure that the structure can be assembled and erected as we have designed. The strict preparation and further processing along with the great eye for details lead to efficient and smooth execution on site.
With the help of Scia Engineer (all modules), complemented with self-written calculation-programs, our calculations are supported with accuracy and speed.

Project information

Owner	Banc of Moscow
General Contractor	POITS
Engineering Office	Stabilogics
Location	Moscow, Russia
Construction Period	04/2012 to 01/2013

Short description | **Bank of Moscow**

The project comprises of a concrete building with an impressive skylight and glass façade. The building will be situated in the centre of Moscow and will be an eye-catcher from the street perspective.
Stabilogics calculated the steel structure for the skylight, façade and glass panels. The company also made the production drawings for the steel, rubber, aluminium and glass panels.
Moreover, Stabilogics designed an assembling system that ranged from its drawings for the laser-cutting to its drawings of the glass panels. This was achieved in a way that meant no dimension had to be measured on-site nor during the production.