

## Skála & Vít s.r.o.

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The Skála & Vít, s.r.o. design and construction office was registered in 1998. The company specializes in building constructional steelwork and shelling.

Our steelwork projects comprise mainly public buildings, logistics and warehouse centres, large retail stores, industrial and agricultural premises including technological constructions.

We prepare and process projects for all project stages, e.g. building permission projects, implementation projects including workshop or production documentation using latest software.

At present we focus on projecting and proving resistance to fire via static calculation of the constructional steelwork, where we emphasize the right construction design methodology and cooperation between all involved professionals. We try to share our approach with the expert public at various seminars which we hold all across the Czech Republic.

In 2002, the company was certified according to the ČSN EN ISO 9001:2001 standard, or ČSN EN ISO 9001:2009 and is member of the Czech Constructional Steelwork Association.



Software: Scia Engineer

## Zlín Congress Centre - Zlín, Czech Republic

### Construction description

The steel construction of the Zlín Congress Centre consists of two steel arches, leaning out from each other and strained in the direction of the longer axis of the building's oval and is made of seamless steel tubes  $\varnothing 610$  mm. The main arches are supported by sleeve bearings on the perimeter attic. The main supports (space diagonals) are set on the perimeter walls of the hall. The arches are tied by lattice pipe braces. The arches support space triangle ribs serving as space piping lattice with bent bottom passes and the top pass overlapping the building's horizontal projection. Prestressed ties are dropped down to the ground surface. Slant surfaces of the ribs, whose horizontal projections are triangular but making up distorted surfaces, are covered with expanded aluminum sheets. The triangular faces of the overhanging elements are covered in the same way.

The steel construction of the restaurant consists of 24 seamless piping half-arch ribs, where the guiding curve is made up of four arches composed into a single unit. On one end, the ribs are set on a concrete sill bearing. On the other end, they are mounted to a central ring set on the inner support and, at the same time, serve as support for the non-transparent part of the roof. The ribs are strutted by pipes mounted at two levels. Three fields of the steel constructions are wind-protected using a system of ties. The supporting structure elements have been designed and evaluated for '15 minute' resistance to fire.

The steel construction of the hanging lighted façade consists of seamless pipes connected to one unit. Between the façade columns, panels made of glass block panels with steel rims are inserted. The panels are mounted on short brackets welded to columns and screwed to the bushes fitted on the rims. Horizontally, the façade is divided into sections, each containing two fields with three columns composed to the V-shape. On the floor level, the façade leans against the perimeter concrete wall, always at the column location. The supports are fitted with gangways, made of square rods and grates, located on three levels corresponding to the building's floors. The gangways serve for façade maintenance or repairs.

### Construction solution

Due to spatial complexity of the constructional steelwork during the first phase we decided to create a spatial structural model with exact geometry projection. The structural model was created in Scia Engineer, using the comfortable import of the 3D geometry from DWG. The ease of the import became evident mainly during a change to geometry, which was done four times just during the creation of the project. The export allows using various filters, e.g. it is possible to import just some of the levels or entities and the current import immediately displays in the preview window. Thus, it was possible to add partial changes in one geometry to a new level and enter them into the structural system also into a special level as lines or arches. The created geometry was then adjusted just by relocating the perimeter element nodes. Here, the advantage of relative nodes showed - they retain their relative position on the element. Another aspect improving effectiveness is arch elements, which are defined by three nodes and are distributed to straight sections only when creating the grid for calculation. Due to the aesthetic function of the construction without continual solid surfaces the temperature load was a decisive factor. We designed the most of support points as sliding to prevent too large powers affecting the concrete structure finished with a 250 mm thick attic.

We designed the restaurant and façade structures in independent computational models. The main curve of the restaurant's cross-link was again created from a DWG file and imported to the Scia Engineer system. The original elliptical shape was replaced by composing two arches into one curve.

Regarding the façade, we dealt just with the largest typical fields.

Project information

Owner Zlín City  
 Architect Prof. Ing. Arch. Eva Jiříčková  
 General Contractor PSG international and Metrostav, a.s.  
 Engineering Office Skála & Vít, s.r.o.  
 Construction Period From June 2009 to October 2010  
 Location Zlín, Czech Republic



Short project description

The Zlín Congress Centre is a steel construction divided into several units. The main part is the roofing, which has both an aesthetic and covering function. The horizontal projection is an oval shape. The primary and secondary axes of the oval are 70.5 m and 42.3 m long. The roof construction camber is 7.5 m. This spanning is overcome using arches and prestressed ribs made of circular cross-section pipes. The ribs are anchored using ties attached to the building foundations. Other parts were the roofing of the steel structure of the restaurant and the hanging façade. The restaurant has a circular platform of 16 m Ø and 4 m height.

