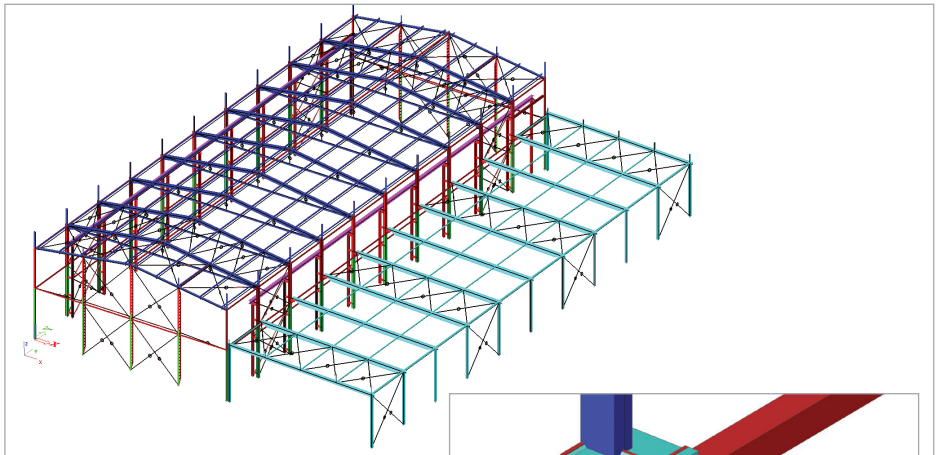
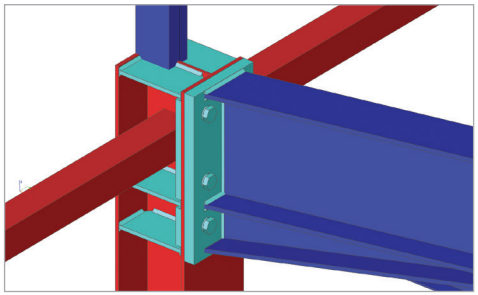
Reconstruction of Existing Industrial Building MOBITEX - Lendava, Slovenia





Software: Scia Engineer

The existing building is currently used for storage activities. A development process demands changes which will allow the company to use the existing building for other purposes. After a redevelopment programme, the reconstructed building will be mostly used as a "Steel structures manufacturing plant". Along one side of the reconstructed facility there will be a new canopy for storage and handling purposes.

Architectural design

The new design is based on the existing structure with a rectangular floor plan of 1,015 m^2 and a double pitched roof with a parapet wall around the perimeter. Along one whole side of the facility there will be a new canopy of 788 m^2, attached to the main columns of the structure with openings on the front and rear sides. Inside the main facility there will be a crane girder with a crane track along the length of the building. The girder is intended for an overhead travelling crane with a hoist that has a 10 t bearing capacity.
The main goal of the design is to modify and strengthen the existing steel structure with minimal additional structural interventions in reconstruction. The crane and the crane girder will be relocated from their current location in another industrial building.

Steel structure design and technical data

Basic steel structure

The main bearing structure consists of double pitched planar steel frames with a span of 20.0 m and a ~5.0 m eaves height. Frame columns are anchored into foundation buckets. The secondary structure consists of roof beams and stability beams with cross diagonal bracings. Both end frames have three facade columns which are also supporting roof columns and wall diagonal bracings.

Modified steel structure

The main structure frames are upgraded to a new eaves height of ~9.0 m with identical steel column sections. On the inner side of the frame, new column strengthening profiles are added parallel to the existing columns with a 0.5 m axial distance and height of 7.4 m. These columns have two functions. Firstly, they are to strengthen the existing structure, and secondly, they are to carry crane loads directly from the crane rail beams which are mounted on top of new columns. The stability of these columns is provided by angular bracing elements in the same fields as the main stability elements of the building and link beam elements to main columns.
Both end frames were raised to a new eaves height and modified to assure the required bearing strength. The roof beams of the end frames were strengthened with a rectangular hollow steel section on the bottom side of the main section while facade columns were strengthened by adding a rectangular hollow steel section parallel to the main column with a 0.30 m axial distance provided by steel plates. Some additional stability beams were also added because of larger buckling lengths.
In total, ~29,993t or 29.5 kg/m^2 of additional steel was needed for the reconstruction of the main facility without consideration of the crane-rail beams.

Crane rail track

The installed crane rail track extends from the second axis and ends 1.2 m from the end of the building. The total length of the track is 43.8 m. No additional steel was added for the crane rail track.

Canopy

The canopy roof structure consists of main roof beams and columns on one side. The roof beams are coped at each end and strengthened with steel plates. Both end frames were designed to sit on two columns, because no additional loads were allowed on the corner columns of the main facility. Stability beams and diagonal bracings were used for global stability. The canopy structure weighs ~23,855 t or 30.3 kg/m^2.

Software and calculation model

Scia Engineer 2012 was used for 3D-Modeling and calculation. The general idea was to achieve the complete use of the existing structure with minimal reconstruction costs, which was provided with optimisation of the structure for at least 16.4 kg/m^2 or ~20% in comparison with a similar structure type and loads on other buildings calculated with other software. With the Scia software, all EC and National standards were also used.

LoGing d.o.o., PE Ljubljana

Contact Matjaž Žabkar
Address Letališka cesta 5
1000 Ljubljana, Slovenia
Phone +386 59059020
Email matjaz.zabkar@siol.net
Website www.loging.si

Personal information: Matjaž Žabkar was born in 1979 in Novo mesto, Slovenia. From 1997-2002, he attended to a Diploma study of Civil Engineering at the University of Ljubljana, specialising in “Steel structures”. In the period 2002-2007, he worked on Architectural and Civil Structure projects, and in 2008 he became a certified engineer in the Slovenian Chamber of Engineers, IZS. Since 2007, he has worked on planning and the optimisation of steel and membrane structures, foundations and other concrete structures, and earthquake resistant structures.

Company information: The company develops, manufactures and erects Office and Manufacturing facilities, Storage halls, Functional constructions, Sports facilities and Mobile halls, Canopies and other structures. The firm cooperates with many Slovenian and foreign partners, developing new products and improving existing programmes and services. In Slovenia, LoGing is one of the leading companies in the field of buildings with inflatable thermal membrane roofs with ETFE, PTFE or LOWE coatings. The production capacity for steel structures is limited to 500 t per month.

Project information

Owner	Dipl.-Ing. Matjaž Žabkar
General Contractor	LoGing, d.o.o. Slovenia
Engineering Office	LoGing, d.o.o. Slovenia
Location	Lendava, Slovenia
Construction Period	05/2013 to 08/2013

Short description | Reconstruction of Existing Industrial Building MOBITEX

The basic purpose of the project is to transform the existing storage hall into a new “Steel structures manufacturing plant” including an overhead double girder crane with a bearing capacity of 10 t. The basic dimensions of the existing building are a width of 20.0 m, a length of 50.0 m and ~5.0/5.6 m in height at the eaves/ridge. The overall weight of steel for the existing structure was 36,864 t or 36.3 kg/m^2.
The reconstruction includes a change of elevation for 4.0 m with the strengthening of bearing steel structure elements, the installing of a crane rail girder moved from another location and the construction of a new canopy alongside the whole length of the building. The new dimensions of the reconstructed building show no change except for the height of the building at the eaves/ridge which measures ~9.0/9.6 m. The canopy span measures ~15.0 m with an eaves height of ~5.2 m. The new weight of steel for the reconstructed structure is 74,695 t or 73.6 kg/m^2 which means 37.3 kg/m^2 of new steel structure. The weight of the canopy structure is 23,854 t or ~30.3 kg/m^2.