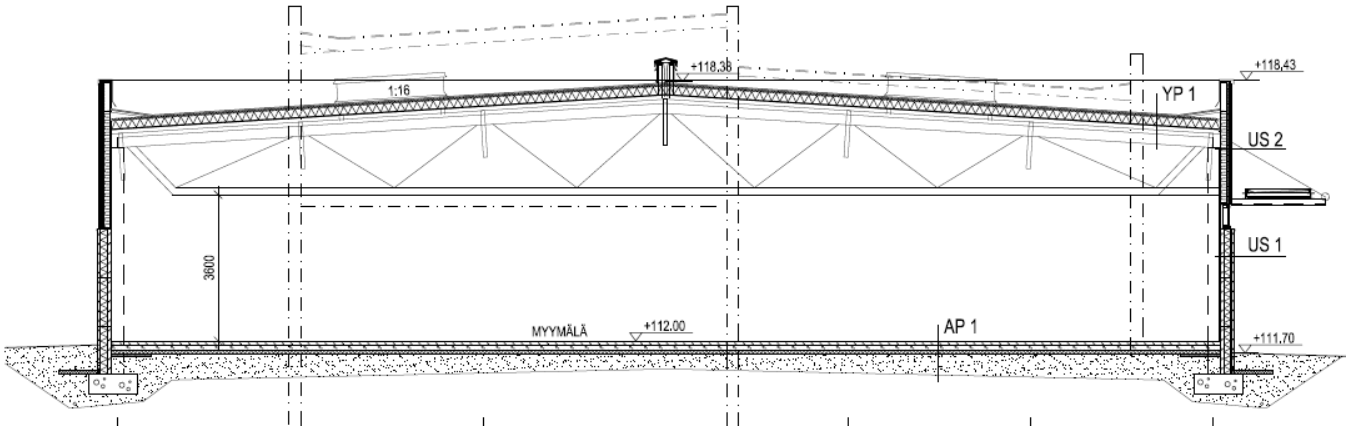
Factsheet no. 10: S-Market, Urjala, Finland

Project summary

Client: SOK Pirkanmaa
Contractor: Rakennusliike Ari Hiltunen
Architect: Seppo Kangasniemi
Structural engineers: Tamratek Oy / Aulis Virtanen
Construction year 2009
Construction cost: About 2M€

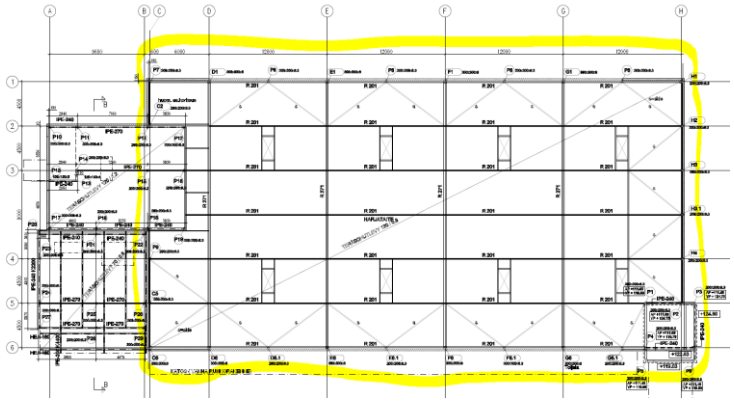
Project description



Cross-section of the new building

The owner of the existing discount store building (~2000 m^2) in Tampere, Finland, SOK, planned to replace it with a new Prisma hypermarket (~10000 m^2). At the same time, SOK also intended to build a new supermarket of similar size in Urjala (about 60 km from Tampere). It was decided to design the new building with a target that part of the main structural components of the disassembled building could be reused in the new location. The existing building was built in 1980's. The main structure consists of composite RHS columns and RHS steel trusses. The walls were made of prefabricated concrete elements and the roof was built in-situ with trapezoidal sheeting, mineral wool insulation and bitumen membrane. The main span of the building was 27 m and total height of 6.3 m. The frames were spaced at cc 12 m with secondary trusses between main trusses with cc 4.5 m. The building was deconstructed and re-assembled between 2008 and 2009.

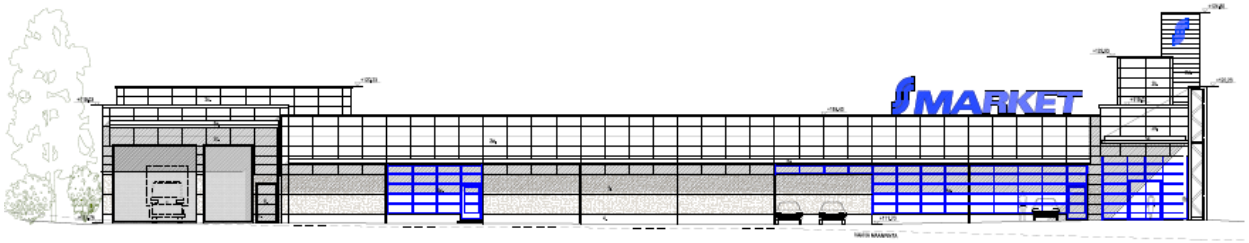
Design process



Floor plan of the new building, re-used part high-lighted

Erection of the steel frame in new location

The original building was located in Tampere, situated in the southern part of Finland, having a Nordic climate with maximum characteristic snow load 1.7 kN/m^2 on roof. The design process was rather simple. The new location belongs to the same loading area as the original one and there were no significant changes in loading codes between the design periods of the original and new building. Moreover, the old building was designed according to the Finnish design code B7 that was still in use, in parallel to the Eurocode, in 2008 and its structural drawings were still available. The structures were checked visually and observed to be in a good condition without mechanical testing. Co-operation with local building authorities was very smooth. Due to some changes in fire regulations, fire protection needed to be designed for the steel frame.



South facade of the new building

Deconstruction and Construction processes

The same contractor was responsible for disassembling the steel structures from the old building and construction the new building. The disassembling process was well prepared and most of the structures were recovered in a very good condition. The main and secondary trusses with bolted connections to the columns were easily removed. The composite columns had bolted foundation connections that were also possible to remove without failures. Double core concrete wall elements and plinth elements (with insulation) were grouted together and were not possible to remove without damage. Also, the U-value requirements were changed from 1980's that made reusing of wall elements difficult. Screw connected trapezoidal roofing decks were removed in a good condition and were easily reused in the new location. Original roofing was hot-galvanized sheeting and the sheeting was painted from underneath in the new location. Also, the main part of the mineral wool insulation was reused. All wall structures in the new location were built from new components: lower parts from double core concrete elements and upper parts from steel sandwich panels.

Due to some changes in fire regulations between old and new building design, roof truss structures were in-situ fire painted in the new location. However, the composite columns had adequate fire resistance as such.

A small part of the new building consisting of shelter and storage spaces was built form new components.

It was estimated that saving in total construction cost was about 10% due to reused steel components.

Main features:
- Degree of reuse ⇨ steel frame (columns, main girders, cross-girders) and trapezoidal roof profiles ⇨ 100%;
- In-situ fire protection of steel frame with intumescent coating;
- New plinth and wall structures;
- Addition of a new bay for the small storage part;
- About 10% saving in total construction costs due to re-using of steel structures.

Internal view of the new building

Further information

The information in this case study is based on interviews with the following organizations involved in the project:

- Client: SOK Pirkanmaa / Timo Lähde
- Contractor: Rakennusliike Ari Hiltunen / Ari Hiltunen
- Architect: Seppo Kangasniemi
- Structural engineers: Tamratek Oy / Aulis Virtanen