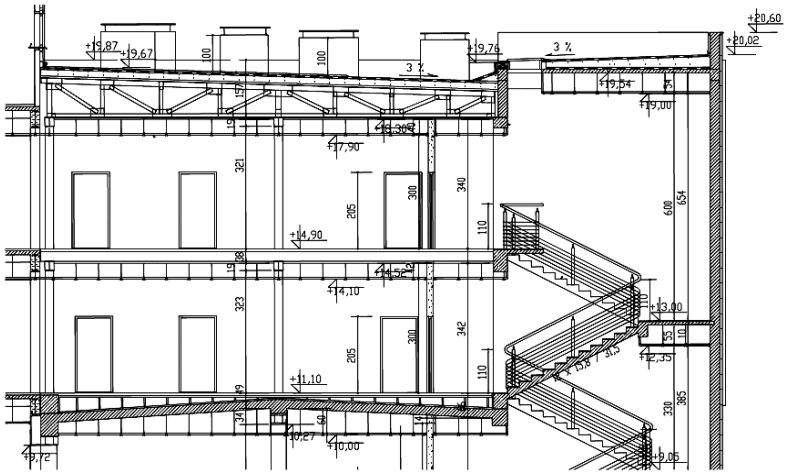
ROOF-TOP EXTENSION OF CIVIL ENG. FACULTY BUILDING IN RZESZOW, POLAND



Cross section of the roof-top extension of the University building

The renovated building is located in campus of Rzeszów University of Technology. It was originally built in the early 1950s for the Building Craft School in Rzeszów, and in 1967 it was taken over by the Civil Engineering Faculty of Rzeszów Technical High School. It was used as a teaching building for students with office rooms for staff and has now been extended by 2 new floors using light steel framing.

It was originally a three storey building, with an underground level. Its length is 64.2 m and its width ranges from 18.7 m on the east side, 12.4 m in the mid-part and 22 m on the west side. The height of the 1st and 2nd floors is 3.5 m and for the 3rd floor, it varies with roof slope from 3.2 m to 3.6 m. The original height of building was 11.4 m and its ground floor area is 918 m^2. Some rooms on the ground floor are functionally separated and connected to a sport hall located on the south side of the building.

The building was constructed in in-situ concrete with 1.5m deep concrete strip foundations. The foundation walls and structural walls (450 mm thick) as well as partitions (140 mm thick) were made of brickwork. The stairs were in reinforced concrete. Reinforced concrete single-span floors with ceramic filling were used and the main span is 5.65 m, and for corridors, is 2.15 m. The roof on the 3rd floor ceiling comprises a slag insulation layer covered with bituminous paper on a concrete base.

According to expert opinion on the proposed renovation work:

- adding new stories involves additional loading to old structure and to the foundations. Calculation and analysis of both the structure and foundation showed that the load from only two lightweight storeys could be applied
- the U-value for the old envelope was much below modern requirements. So, the decision was made to replace the old windows and apply a ETICS (External Thermal Insulating Composite System) layer to the existing façade to increase the insulation level considerably
- construction work was only possible during three months summer holidays, and so the new structure must be easy and fast to assemble, with minimum intervention to the old building.

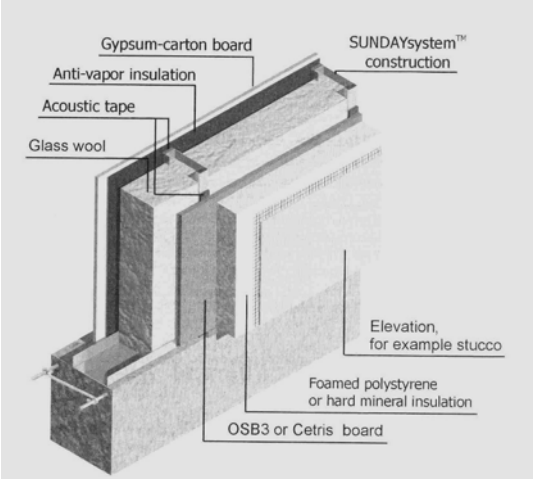
The structure of the roof-top extension was therefore designed in light steel framing in order to satisfy these technical and constructional requirements.

.

The advantages of an extension built in light steel framing are:

- the lightness of construction – the light steel frame adds less than 10% additional weight to the foundations and bearing walls
- a limited period of heavy construction equipment usage
- no wet work – a dry-assemble technology
- a short period of construction;
- a light steel structure makes it possible to apply any façade as well as any internal wall finish
- reduced disturbance during construction work

Applied technology: SUNDAYsystem™



Cross-section of external wall

Roof-top extension during construction

Renovated building showing its 2 new floors

Construction Details:

The external walls are made of light steel sections (C 90 or C 140 C-shaped profiles), o at 600 mm spacing, placed at their top and bottom in U 90 or U 140 U-shaped profiles.

Wall panels, assembled in the factory, provide for window and doorway openings, and include special lintels. Finishing of internal surfaces of steel wall panels was made using gypsum boards. For external walls, on impregnated OSB board with PE vapour membrane, 80 mm of mineral wool was placed, and covered by “Reynobond” aluminium composite panels with polyethylene filling. An additional layer of thermal insulation of thickness equal to the depth of the steel profile was placed within the wall panels.

For the floors, C 90 and C 140 C-shaped profiles, as well as the U 90 and U 140 U-shaped profiles are used, in various configurations. The typical spacing of the floor members is 600 mm.

Floor finishing was made from PVC lining on the base of gypsum-fibre board ”Fermacell” separated by 10 mm of mineral wool layer of OSB board. Suspended ceilings of gypsum board with aluminium frame were used.

The load-bearing structure of the roofs comprises steel trusses made of the C 90 and C 140 C-shaped profiles. Truss joints are covered with metal sheets on both sides. Connections are made with the use of sheet-metal screws. Bracing of the roof structure is also made by C 140 or C 90 C-shaped profiles. The typical roof girder spacing is also 600 mm. An external waterproof layer made of “Rhenofol CV” roof membrane on 10 mm of “Braas” glass fibre fabric was used.