Roof-top extension of an existing concrete framed industrial building using hot-rolled sections that provide 2 new floors of studios for digital systems and another of offices. The construction process was achieved without having to move the occupants.

ROOF-TOP EXTENSION IN SAINT-OUEN (F)

View from the corner of workshops - view of access

This project is situated in suburb close to Paris, in a former district which mixes residential and industrial buildings. The order of the Parisian company of transport (RATP) was to build vast surfaces for workshops and offices on a very small and already occupied ground.

The two-storey existing building is a big hall for the maintenance of subway trains. Its structure is based on a classical system with reinforced concrete columns and infill walls.

The main constraints were in one hand to find technical solutions to create two new floors without having to stop the activity during the construction process and, on the other hand, to integrate the extension into the volume required by the rules of urban plan.

The architects have chosen to take advantage of difficulties by cutting the program in two separate entities: one part for workshops on two floors, the second for offices they have designed a roof-top extension which expresses the industrial character of the project.

Other requirements of the client were to align floors with those of the adjoining building and, in the same time, to have a height under ceiling of 2.65 m, compatible with those of the containers of electronic cards

The architectural approach was to use a steel frame outside the existing building and industrial modules to accommodate these extensions, putted from a patio on each side.

The two new floors of workshops, each of approximately 400 m^2 floor area, provide high quality open space. The overall construction cost of the new parts of the building is about 1 700 € per m^2 gross area. At the end, we obtain a lower cost than a concrete solution primarily imagined and assessed with a reinforcement of existing building and the construction of the extension:

a good demonstration of the efficiency of steel construction technology in renovation sector.

Sustainability Benefits:

- Rapid construction system with minimum disruption on site
- steel frame does not over-load the existing building
- Occupants are not displaced during the construction work
- Two new floors of workshops each of 400 m^2 area are created cost effectively

Project Team:

Client:	RATP, Paris
Architects:	Nomade Architectures
Project Manager:	Raphael CHIVOT
Contractor:	Brezillon

View of main steel frame on site

Global view of project

Construction Details:

The solution was to use a steel main frame formed by five external portals (at 4.5 m spacing) that forms an independent construction.

Directly put on the ground, the new columns are based on micropickets in concrete. The transfer of loads is without impact on the existing building.

The new steel beams placed at roof level consist of HE500A sections, which are supported joists made with IPE 270 sections. Those ones are attached to the top flange of the main beams, in order to allowing the part of services of technical slabs

Staircases and elevators are placed on the side face of the building, in one concrete 'box' which assures the wind bracing of the whole structure.

The erection of the structure was realized in only two months with a mobile crane placed on the way of fire brigade.

Initially, the construction site was very technical and complex:

- access to the ground only by a way for fire brigades,
- absence of setback,
- Difficulties for supply and storage,…

The facades are made different layers. First, sandwich panels are fixed on a secondary frame (light steel C sections) and provide an "internal insulation layer'. The external skin is composed with Trespa metallic panels (an open joints system is used for panel connections) and/or panels of alveolar polycarbonate for windows

The roof consists of classical water proofing system with rigid insulation boards placed on steel sheets.