Apartment Building in Ostermundigen, CH

PROJECT SUMMARY
Housing renovation with new floor plan and creation of four penthouse maisonettes.
Reduction of heating energy: 60%

SPECIAL FEATURES
Innovative ventilation system

ARCHITECT
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SHC
SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

IEA – SHC Task 37
Advanced Housing Renovation with Solar & Conservation

Before

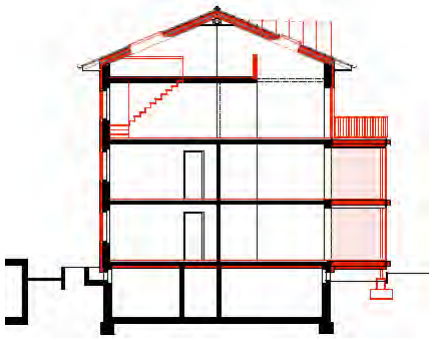
After

BACKGROUND

This apartment building from 1965, was in need of renovation and had been vacant for 1 ½ years until the architects Rollimarchini were able to finance its purchase and renovation. The new apartments are today, after the refurbishment, handicapped accessible, have a contemporary layout with improved daylight use and combine a raised living standard with a considerably reduced heating energy demand. In addition, more rentable living space was achieved by creating four penthouse maisonettes.

SUMMARY OF THE RENOVATION

- Insulation of the building envelope:
  roof (280 mm), façade (140 mm)
  basement ceiling (140 mm)
- New triple glazed windows
  (U-value$_{glass}$: 0.5 - 0.7 W/m²a, g-value: 51 - 58%)
- New technical systems core with elevator
- Attic converted into four penthouse maisonettes
- Enlarged balconies with sunspaces
- Renovated bathrooms and kitchens
- Ventilation system (HRC 80%)



Section

Floor plan

CONSTRUCTION

Roof construction *U-value: 0.18 W/(m²·K)*

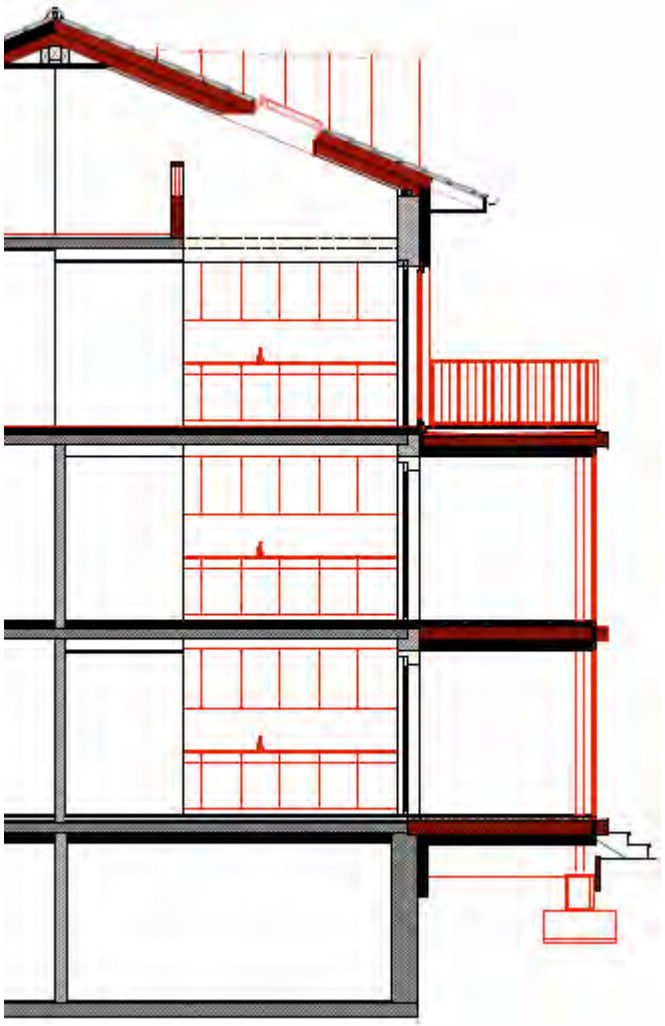
(top down)	
Roof tiles (existing)	
Wooden strapping	24 mm
Air gap, wooden cross strapping	60 mm
Roof sheating	18 mm
Mineral wool insulation	140 mm
Wood planking (existing)	20 mm
Cellulose insulation	140 mm
Mat	25 mm
Gypsum board	18 mm
Total	445 mm

Wall construction *U-value: 0.19 W/(m²·K)*

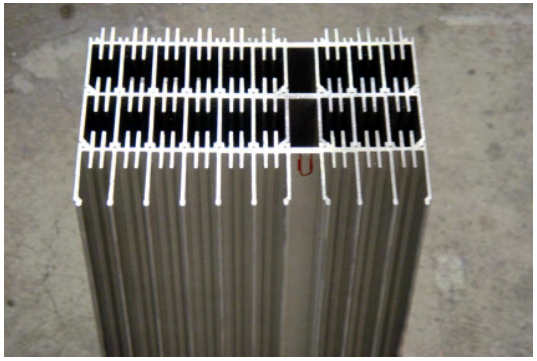
(interior to exterior)	
Interior plaster	15 mm
Brick wall (existing)	300 mm
Exterior stucco (existing)	15 mm
Mineral wool insulation	140 mm
Mineral plaster with reinforcing net	15 mm
Total	485 mm

Basement ceiling *U-value: 0.37 W/(m²·K)*

Parquet flooring	18 mm
Gypsum board and paperboard	30 mm
Cement mortar (existing)	50 mm
Separation gap (existing)	10 mm
Reinforced concrete (existing)	140 mm
Mineral wool insulation	140 mm
Total	388 mm



South façade with enlarged balconies (new elements in red)



Summary of U-values W/(m²·K)

(W/m²K)	Before	After
Roof	2.00	0.20
Walls	0.42	0.23
Basement ceiling	1.50	0.23
Windows*	2.70	1.2 - 1.3

* including frame

BUILDING SERVICES

Since the existing oil furnace was still functional, the architects decided not to replace it yet. Although an additional living area of 370 m² had to be heated after the renovation, today, 12'000 litres of heating oil are saved per year.
The novel ventilation system with heat recovery (efficiency 80%) exchanges the heat, thanks to its special profile, directly inside of the aluminium ducts and doesn't need an additional heat exchanger. The ventilation system electrical consumption amounts to 3.59 kWh/m²a. The fans have 54 W connected power.

ENERGY PERFORMANCE

Space + water heating (primary energy)*
Before: ca. 173 kWh/m²
After: 69 kWh/m²**
Reduction: 60 %

*Swiss Standard: SIA 380/1: 2001
**The new living area after the renovation is 370m² larger

INFORMATION SOURCES

Enz, D.: *Bauerneuerung für die Zukunft,* Flumroc AG, Postfach, CH-8890 Flums, 36 pages (German, French, Italian) www.flumroc.ch
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