Ansitz Kofler - Ventilation

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Classical central Ventilation with ducts integrated in the floor

HVAC

What is the solution?

Centralized mechanical ventilation system with heat recovery with ducts integrated in the floor. The ventilation unit is placed in a crawlspace above the kitchen, benefitting from the ample room height of 4m. The distribution ducts are integrated in the anyway refurbished floor, together with the hydraulic system in a concrete layer between thermal and sound insulation. Advantage from conservation point of view is the fact, that with ventilation system high indoor humidities which might induce condensation within the construction at any week point are avoided.

Why does the solution work?

Compatibility with conservation: Integrating the distribution ducts in the floor allows to hide them, nevertheless this measure can be adopted only if modifications to the existing floors are not restricted. Moisture safety: With ventilation systems high indoor humidity which might induce condensation within the construction at any weak point is avoided. Energy improvement: A central system for controlled ventilation with heat recovery ensures not only that the necessary exchange of air takes place automatically but also that the incoming air from outdoors is warmed by cooling the exhaust air (the “Air-to-Air Heat Exchanger” recovers up to 85 percent of the heat from outgoing air). Introducing an automatic summer bypass unit guarantees that the outside air almost completely bypasses the heat exchanger preventing the supply air from being additionally warmed during warm summer months.

Description of the context:

The main building of "Ansitz Kofler" was built in 1749 and had in 1769 Wolfgang

Amadeus Mozart as a guest. The Orangerie was added a bit later: as 30m long and 5 m wide structure with spacious and bright rooms, used for breeding tropical fruits - for which the climate in Bozen, even if south of the Alps, would otherwise have been too harsh. In 1925 the Orangery was converted to a dwelling: the windows were scaled down, and internal walls were added, forming a suite of rooms aligned with each other (so called enfilade). As typical for buildings of this age in Bozen, the bearing structure is a stone masonry, with stones of different size, taken from the rivers in the area.

Pros and cons of the solution:

The pros of the solution are that the mechanical ventilation systems with heat recovery provide better air quality, lower humidity and no condensation. Keeping slight negative pressure avoids that warm, humid interior air enter via cracks into the construction (causing moisture issues there). Another advantage is that the constant supply of warm air through the heat recovery system can reduce energy costs because the environment temperature is kept constant, this provides greater comfort in cold climates. The disadvantages of the system are that mechanical ventilation systems with heat recovery do require that filters and fans must be kept clean to ensure effective operation (additional maintenance costs). That the heat recovery work efficiently a good level of airtightness must be achieved in the rooms where it is installed, this can lead to additional costs. Since heat dispersed from ceiling ducts reaches the upper air first, the HVAC system has to work harder to push the heat lower into a room. It is always necessary to check the space availability for the mechanical systems and to control the dimension of the air ducts.

Type of data available (level of information, simulation):

This ventilation system is monitored by measuring temperatures and relative humidity in different positions of the system (fresh air intake, fresh air after air to air heat recovery, supply air after air to air heat recovery, return air and exhausted air). These measurements are used to evaluate efficiency of the air heat exchanger and determination of preheating and pre-cooling.

Are there any related publications or pictures of the solution?

Ventilation unit in the crawlspace above the kitchen, © Manuel Benedikter Architekten