



## Facade integrated ventilation system

Author: Alexander Rieser (UIBK), Arnulf Dinkel (ISE)

Facade integration of air ducts

### HVAC

#### *What is the solution?*

The integration system consists in different prefabricated components. At first a two-layered insulation system made of mineral wool integrates air ducts in the façade. The first layer is composed of preformed insulation boards in which the air ducts can be easily clicked in. The air ducts are made of galvanized steel and the connection pieces of the ductwork are equipped with sealing rings to avoid leakages and enable an easy mounting process. Figure 1 and Figure 2 show the concept of the prefabricated insulation boards with the possibility to integrate ventilation ducts: Red are the exhaust air channels and blue the supply air channels. They all will be conducted to the roof where the ventilation units with the heat exchanger are located. The second main component of the system is the insulation frame for the installation of the windows in the insulation layer. This frame is slightly deeper since the air inlets and outlets have to be integrated between the existing wall and the window. To integrate the air inlets and outlets, prefabricated boxes have been designed and implemented in the same material as the installation frame. (figure 3 and figure 4)

#### *Why does the solution work?*

About the air inlets in the prefabricated box integrated in the new windows the supply and exhaust air will get into the apartments. The air ducts are made of galvanized steel and the connection pieces of the ductwork are equipped with sealing rings to avoid leakages and enable an easy mounting process. After placing the Air in- and outlets in the window frame elements the first layer of the insulation boards will be connected. Afterwards the ducts are installed, the

remaining gaps are fulfilled with fitting elements of mineral wool. After the installation of the air ducts, a layer of mortar has been applied on the first insulation layer to equalize the surface and facilitate the sticking of the second insulation layer. (figure 6) After that a second layer of insulation will be installed. The façade integrated air duct lead ventilation air to the ventilation systems with heat recovery place in the attic. As the attic is a non-heated zone, all air ducts in this room have been insulated with 80 mm mineral wool. Sound attenuators have been installed to avoid the noise of the fans to disturb the tenants.

*Pros and cons of the solution:*

The solution is a flexible refurbishment system for different building geometries and a minimally invasive installation is possible. The mounting is quick and relatively simple. Furthermore, there is also an individual choice of technology and materials (fire protection). Due to the high level of part prefabrication, a high quality standard is achieved and a subsequent upgrade is possible. The unfamiliar handling of the system must be mentioned as a disadvantage. Since this type of ventilation is new, a certain period of adjustment must be planned for the craftsmen. However, after a period of acclimatisation, the craftsmen have become very familiar with the new system.

*Additional information about the solution:*

article on the ISE Fraunhofer Institute website: <https://www.ise.fraunhofer.de/en/research-projects/retrokit-toolboxes.html>

*Are there any related publications or pictures of the solution?*

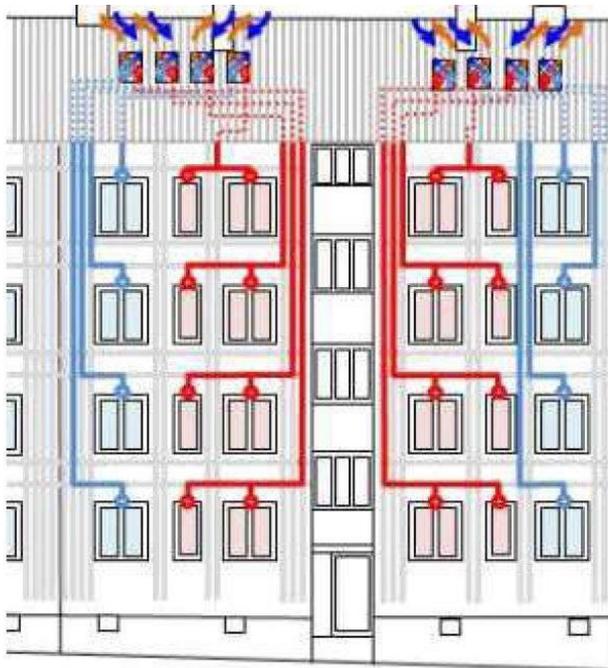


figure 1: © Fraunhofer Institut, Indicated location of the installation channels in the front of the house

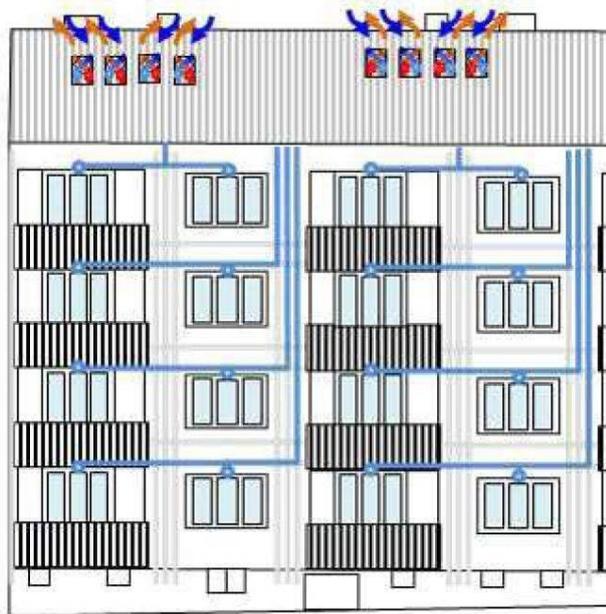


figure 2: © Fraunhofer Institut, Indicated location of the installation channels in the back of the house

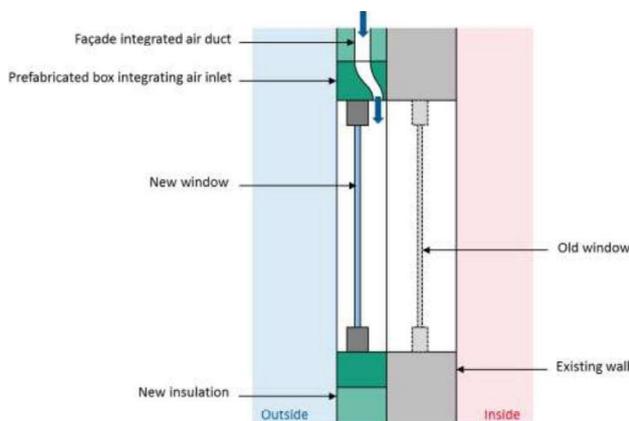


figure 3: © Fraunhofer Institut, Section of the installation frame of the windows and of the prefabricated box integrating the air inlet



figure 4: © Fraunhofer Institut, Prefabricated box integrating the air inlet before installation of the new window (left) and after (right)

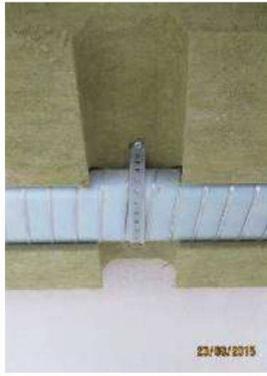


figure 5: © Fraunhofer Institut, additional fixing element and filling elements made of mineral wool to avoid remaining cavities in the insulation layer



figure 6: © Fraunhofer Institut, layer of mortar on the first insulation layer with integrated air ducts

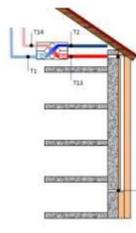


figure 7: © Fraunhofer Institut, sound attenuators and insulated air ducts in the attic (left) ventilations devices with heat recovery (center) and position of the ventilation devices

[https://www.hiberatlas.com/smartedit/projects/228/14\\_dt\\_ISE\\_Flyer\\_Fassadenelemente.pdf](https://www.hiberatlas.com/smartedit/projects/228/14_dt_ISE_Flyer_Fassadenelemente.pdf)

Flyer multifunctional façade elements (only in german)