

FOCCHI

Product: Flexible structural connectors

FOCCHI designs, produces and installs complex façade systems for high-quality buildings.

The tested solution is an innovative multifunctional façade system integrating IoT, heat pumps, automatic blinds and windows to ensure indoor comfort and energy efficiency.



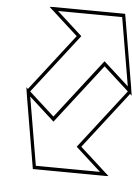
Multifunctional façade

Pilot Measurement & Verification Line 2

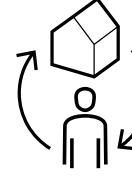
Managed by: EURAC Research



PM&VL2



EFFICIENCY



INTERACTION

The scope of the PM&VL2 is a complete characterization of all the envelope parts and their effects on internal occupants in real operating conditions. The Multifunctional Façade Lab (MFL) node verifies the thermal and energy performances of envelope systems such as doors and windows, opaque walls and façade modules under both stationary and dynamic conditions.

Which is the need covered by this service?

This node of PM&VL2 covers the testing and development of a multifunctional façade designed for achieving Nearly Zero Energy Building (nZEB) balance and ensuring multi-comfort (thermal, visual, and acoustic comfort) with Indoor Air Quality (IAQ). The prefabricated façade integrates heating/cooling systems, ventilation, automated controls, and sensors for optimal performance. The goal is to offer an energy-efficient building envelope applicable to both new and existing structures. Testing procedure involves thermal characterization and assessing integrated component performance in controlled environments.

Design of Experiments

Experiments included testing the sample under summer and winter design conditions to evaluate possible critical temperatures to be reached by façade and its integrated components, as well as testing the proper functioning of the integrated heat-pump.



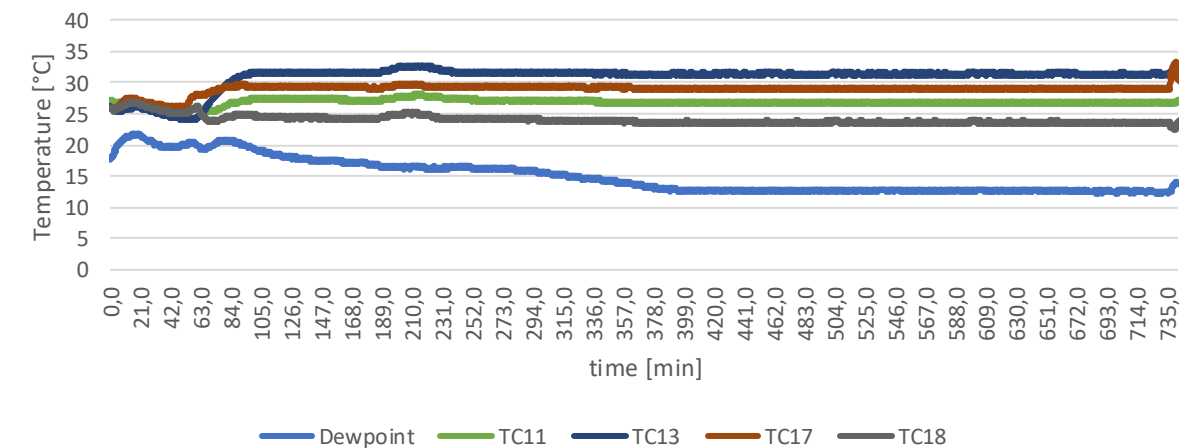
MFL, one of the nodes of PM&VL2

Results

Results of the testing procedures are reported in the table below:

Test	T in	T out	Solar radiation	Shading	Heat pump	Results
1	32 °C	38 °C	600 W/m ²	0°-off	off	Maximum temperature of 49.5°C measured on the outdoor frame.
2a	free floating	38 °C	600 W/m ²	0°-off	on	HVAC unit did not manage to reach the design indoor temperature.
2b	free floating	38 °C	600 W/m ²	90°-off	on	HVAC unit did not manage to reach the design indoor temperature.
3a	25.5 °C	38 °C	off	0°-off	on	No condensation risk was found due to heat pump components.
6	18.5 °C	-12 °C	off	0°-off	on	No condensation risk was found on the frame and glazing of the façade, at both sides. Minimum temperature of around -11°C on external side of the façade.
7	18.5 °C	-12 °C	off	0°-off	off	No condensation risk was found on the frame and glazing of the façade, at both sides. Minimum temperature of around -11°C on external side of the façade.
8	free floating	-1 °C	off	0°-off	on	HVAC unit did not manage to reach the design indoor temperature.
10a	20°C	20°C→0°C 0°C→20°C	off	up	off	No condensation risk was found.

Test 3a - Condensation risk



Example of a test result: temperature profiles were measured by a set of thermocouples (TC11, TC13, TC17, and TC18), and the dewpoint temperature profile was calculated. Since the dewpoint temperature never exceeds the measured temperatures, no condensation risk is expected.

Conclusions

The testing of the facade system aimed to assess its operation under various conditions but encountered some technical challenges. Tests under winter and summer conditions highlighted the system's ability to mitigate condensation risks, though challenges were noted in maintaining setpoint temperatures. Overall, the results offer valuable insights into the facade system's performance, providing a basis for future improvements and optimizations.



The sole responsibility for the content of this poster lies only with the authors. It does not necessarily reflect the opinion of the European Union. The European Commission is not responsible for any use that may be made of the information contained therein. The MEZeroE Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 953157.

Research partner:



Main author:

Riccardo Pinotti riccardo.pinotti@eurac.edu

Industrial partner:



Want to know more?

- Follow us on LinkedIn

- Write us to contact@mezeroe.eu

- Visit our marketplace www.mezeroe-platform.eu

