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# МОЛОДІЖНА НАУКА: ІННОВАЦІЇ ТА ГЛОБАЛЬНІ ВИКЛИКИ

## ЗБІРНИК ТЕЗ

Міжнародної науково-практичної конференції студентів,  
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### ***DESIGN ASPECTS OF VENTILATED FACADES***

Ventilated facades are one of the most popular and effective building cladding systems. They provide natural ventilation of the space between the facade surface and the insulation, which helps to remove moisture, reduce the risk of condensation and maintain a stable temperature inside the premises. However, despite their high efficiency, ventilated facades can be exposed to various loads, which over time causes wear and tear and the need for structural reinforcement. We have considered rational methods of reinforcing ventilated facades, which allow to increase reliability and extend the service life of the facade system.

#### *The main causes of wear and tear of ventilated facades*

Deterioration of ventilated facades can be caused by both natural factors and structural defects or technological violations. The main reasons include:

- Climatic influences: temperature changes, precipitation, ultraviolet radiation and wind negatively affect facade materials, especially facing panels and fasteners.
- Mechanical loads: wind and seismic loads can lead to deformation and weakening of the facade system.
- Corrosion of metal elements: in conditions of high humidity, metal fasteners and load-bearing elements are subject to corrosion, which reduces their strength.
- Changes in the geometry of the building: during operation, deformation of the load-bearing structures of the building is possible, which affects the condition of the facade system.

Therefore, ensuring the reliability of ventilated facades requires the use of rational reinforcement structures that are able to compensate for the influence of external factors and extend the service life of the facade.

#### *Methods for strengthening ventilated facades*

Reinforcement of load-bearing fasteners. Load-bearing fasteners are one of the most vulnerable parts of a ventilated facade system. During operation,

fasteners can wear out, which leads to their weakening and the risk of collapse of the cladding panels. To strengthen the fasteners, you can use:

- Replacement of worn elements: in case of corrosion or mechanical wear of individual fasteners, it is recommended to replace them with new ones made of corrosion-resistant materials.

- Additional fasteners: installation of additional fasteners in places of greatest loads allows you to evenly distribute the load over the entire area of the facade, reducing the risk of local shifts.

Use of reinforcing profiles. Metal or composite reinforcing profiles are installed in places of greatest load and contribute to increasing the rigidity of the structure. Such profiles ensure the resistance of the ventilated facade to wind loads and reduce the risk of deformation of the cladding panels.

#### *Modernization of the ventilation system.*

Ensuring proper ventilation is a key factor in avoiding moisture accumulation between the facade surface and the insulation. Additional ventilation holes or replacing existing ones with larger ones can improve air circulation, which reduces the risk of corrosion and fungus. Modernizing the ventilation system ensures rapid moisture removal, which is important for regions with high humidity.

#### *Materials for reinforcing ventilated facades.*

Various materials are used to reinforce ventilated facades, which increase their resistance to external influences:

- Corrosion-resistant metals (aluminum, stainless steel): they avoid corrosive wear of fasteners.

- Composite materials: lightweight, strong and weather-resistant composites are often used for cladding panels and fasteners.

- Anti-corrosion coatings: for metal elements, the use of protective coatings helps to significantly extend their service life.

#### *Practical recommendations for strengthening facades.*

Before carrying out reinforcement work, it is necessary to conduct a detailed inspection of the facade to identify weak points. In particular, attention should be paid to the following aspects:

1. Assessment of the condition of fasteners and load-bearing elements: checking for corrosion, deformations and wear.

2. Analysis of the ventilation system: determining the efficiency of ventilation to prevent moisture accumulation.

3. Replacement or repair of damaged panels: in the presence of cracks, delaminations or other defects on the panels.

After assessing the condition of the facade, you can proceed to choosing the appropriate reinforcement method. Depending on the nature and extent of damage, you can use both a full set of measures and only their individual elements.

Thus, rational reinforcement designs for ventilated facades can reduce the cost of major repairs and significantly extend the service life of the facade system. The use of corrosion-resistant materials, reinforcing profiles, ventilation modernization and regular facade inspection are key factors in maintaining the reliability and durability of a ventilated facade.

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