ISSN 1339-3189 5/2023

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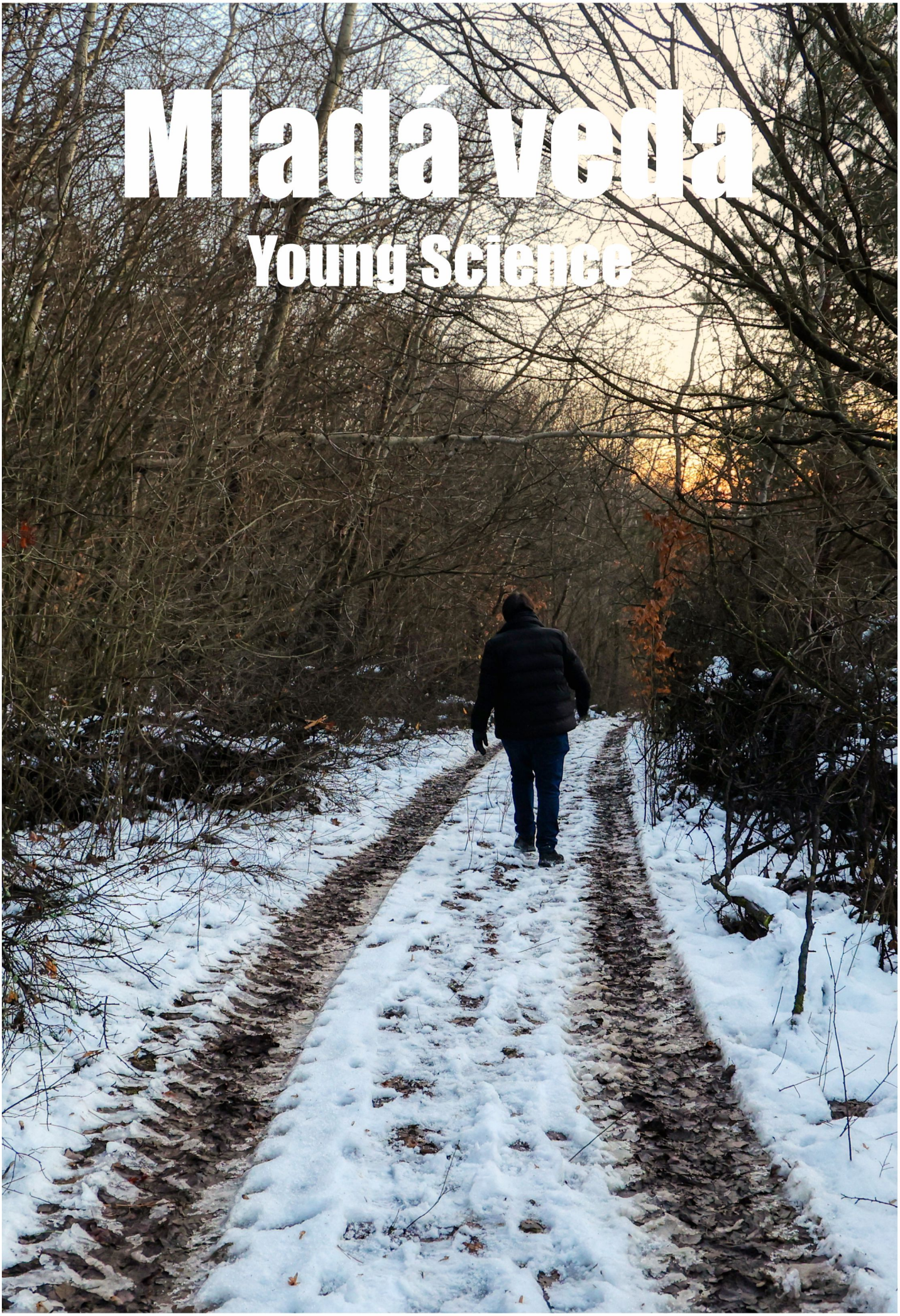
Young Science



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MEDZINÁRODNÝ VEDECKÝ ČASOPIS MLADÁ VEDA / YOUNG SCIENCE

Číslo 5, ročník 11., vydané v decembri 2023
ISSN 1339-3189, EV 167/23/EPP
Kontakt: info@mladaveda.sk, tel.: +421 908 546 716, www.mladaveda.sk
Fotografia na obálke: Zimná prechádzka. © Branislav A. Švorc, foto.branisko.at

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Mladá veda
Young Science
ISSN 1339-3189

Vol. 11 (5), pp. 151-157

COMPARISON OF FACADE FINISHES BASED ON SELECTED INDICATORS

POROVNANIE POVRCHOVÝCH ÚPRAV FASÁDY NA ZÁKLADE VYBRANÝCH UKAZOVATEĽOV

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Abstract

The aim of the article is to compare selected facade finishes from several points of view. Silicone facade plaster and wooden milled facade cladding were selected in the article. Silicone facade plaster is considered a common surface finish of buildings. As for facade cladding, there are several types, the article will consider one specific type that will be used on selected objects. Both types of surface treatments will be installed on thermal insulation made of mineral wool with a thickness of 180 mm.

Key words: facade, comparison, plaster

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Mladá veda
Young Science
ISSN 1339-3189
Vol. 11 (5), pp. 151-157

Abstrakt
Cieľom príspevku je porovnanie vybraných povrchových úprav fasád z viacerých hľadísk. V článku boli vybrané práve silikónová fasádna omietka a drevený frézovaný fasádny obklad. Silikónová fasádna omietka je považovaná za bežnú povrchovú úpravu objektov. Čo sa týka fasádneho obkladu je niekoľko druhov, v článku bude uvažované s jedným konkrétnym druhom, ktorý bude na vybraných objektoch použitý. Oba druhy povrchových úprav budú inštalované na vyhotovenú tepelnú izoláciu z minerálnej vlny hrúbky 180 mm.
Kľúčové slová: fasáda, porovnanie, omietka

Introduction

Currently, investors make decisions about materials mainly on the basis of investment costs, which may, for example, also have an impact on future maintenance costs. Therefore, it is necessary for them to consider several criteria when choosing materials.

One of the first features that we notice on the object is the external appearance, namely the facade. Currently, there are several options for surface facade treatment on the market, which include facade plasters and coatings of various types, facade cladding made of stone, ceramic cladding, wooden cladding or board facade cladding of various bases. The choice depends on the requirements of the property owner, the surrounding environment, finances and much more.

Milled wooden cladding

Wooden facades must meet certain requirements such as temperature differences, humidity, resistance to UV radiation and pests. These requirements are influenced by the very location of the object to the cardinal points and the weather conditions in the given location. Wood is a hygroscopic material, which means that it shrinks or swells due to moisture. Humidity is caused by climate changes, namely rain, snow and air humidity. In addition to these mentioned aspects, humidity can also occur in the form of condensation. The moisture content of wood is defined as the proportion of water in the wood that is in equilibrium with the surrounding moisture. In winter, wood contains about 25% water and in summer, about 10% water. The effect of UV radiation on wood causes its degradation and has an adverse effect on the surface, which shows signs of aging. A suitable type of wood will contribute to the overall durability of the cladding. In the production of milled profiles, middle lumber is used.

In this article, the material ThermWood is used, which in this case is thermally treated pine wood. Heat treatment changes the physical and mechanical properties of wood. It is more resistant to rot and wood decay fungi, which extends its life by at least 30 years by removing resins and biological substances from the wood. It also maintains its volume stability. Heat treatment of wood consists in the use of high temperatures (190°-212°C) and steam, which makes this production process ecological. (Thermowood.sk, 2023)

The Rhombus profile will be used for the objects. The profiles are stored vertically for a better optical result. Better drainage of rainwater is also achieved with this storage. During assembly, the gaps between the individual profiles are omitted, which gives the facade its dynamism and at the same time better ventilation of the facade is achieved. The thickness of the profile is 20mm.

The already made thermal insulation includes brackets passing from the wall, on which the profiles will be mounted. It is a ventilated facade. The DELTA-FASSADE 200 PLUS diffused facade waterproofing film, which is also resistant to UV radiation, is installed over the prepared thermal insulation. DELTA-TAPE self-adhesive sealing tape is installed at the places where the anchoring profiles will be installed, which will ensure hermetic closure of the passage of the anchoring elements. Next comes the installation of vertical aluminum profiles on the prepared brackets. To ensure ventilation of the facade, the distance between the profile and the wall must be at least 57mm. The axial distance of the vertical aluminum profiles is 600 mm. For faster construction, a pre-assembled facade module is used. Facade profiles are attached to horizontal counters 30x50mm, 600mm apart. The attachment is made from the inside (hidden assembly), which does not disturb the overall impression of the facade. The distance between individual profiles is at least 10 mm. The lower edge of the cladding starts 300 mm above the ground and is equipped with an aluminum net against pests. (Thermowood.sk, 2023)

Silicone facade plaster

In the article, the highly resistant, vapor-permeable, silicone facade plaster Baumit StarTop was selected. Its composition ensures the rapid removal of water and air humidity from the surface of the facade. Thanks to the rapid removal of moisture from the facade, it is more resistant to pollution and the action of organisms. Grain thickness 2mm with a consumption of 2.6kg/m^2, scratched structure. (Baumit.sk, 2023)

It is a contact insulation system. For the prepared thermal insulation, window and corner profiles are installed in the adhesive screed. In the corners, an added diagonal reinforcing mesh with dimensions of 500x250mm is made. Baumit ProContract adhesive screed is applied over the entire surface using a steel trowel with a 10mm tooth, into which the reinforcing mesh is inserted. The reinforcing mesh strips are installed with an overlap of 100mm. Subsequently, the surface is smoothed with a trowel. The reinforcement cover is 1mm, the thickness of the reinforcement layer is 3-5mm. The application of Baumit Uniprimer penetration coating will begin 6 days after the completion of the reinforcing layer. It is applied evenly and over the entire surface using a roller. The next day begins with the final treatment, namely Baumit StarTop facade plaster. It is applied evenly with the help of a steel trowel with a grain thickness of 2mm. Immediately after application, the desired scratched structure is created with a plastic trowel. (Baumit, s.r.o., 2023)

Comparison of surface finishes

The comparison is made on 1 of 3 objects.

When comparing individual facade modifications, we consider the area of the entire building, which is 664.51 m^2. (BL, s.r.o., 2020)

Construction

Time schedules were prepared for construction comparison. Realization of wooden cladding consists of dry processes during which no technological break is necessary. The entire implementation takes 8 days under favorable weather conditions. An average of 12 workers

per day with a working time of 10 hours will participate in it. During the implementation of facade plaster, emphasis is placed on observing technological breaks, which are given by the manufacturer of the given material. Facade plastering takes 15 days with 7 workers, with a working time of 10 hours.

From the point of view of the speed of implementation, a wooden facade is more advantageous. The difference between the facades is 7 days. As for the deployment of workers, the facade plaster is more advantageous, where 7 workers per day are involved in the implementation, while for the wooden one, an average of 12 workers per day is considered.
In this comparison, it is necessary to pay attention to the necessary storage space on the construction site. With the realization of a wooden facade, more space is needed than with facade plaster, due to the size of the object's area and the amount of necessary wooden boards.

Service life and maintenance

The service life of a wooden facade is stated by the manufacturer to be at least 30 years without any interventions. The ThermoWood heat treatment does not protect the wood against UV radiation. Due to the influence of UV radiation and weather conditions, the wood changes its shade (gray), the wood naturally ages, causing it to crack and slightly bend. If we want to prevent this process, it is necessary to protect the wood with a coating against UV radiation. A coating based on alkyd or acrylic resins is recommended. The coating minimizes maintenance time. Before painting, it is necessary to sand the wood with sandpaper designed for wood. Surface treatment is recommended once every 3 years. This treatment consists of UV coating, which only affects the external appearance.

The service life of the facade plaster is estimated at 10-15 years, when the surface treatment is replaced with a new facade paint. Cleaning the facade is recommended every 5 years, depending on the pollution. Cleaning from dirt deposits is carried out with a weak stream of warm water with a maximum temperature of 35 °C. In the case of contamination with algae, it is necessary to use preparations designed for this. When renewing the facade paint, the rules of material tolerance, cohesion and vapor permeability apply.
The service life and maintenance of both materials is given under the assumption of proper use. By comparing these two facade treatments, it is not unequivocally determined which one is less demanding to maintain. Over time, each of the surface treatments requires the necessary care for its better appearance. However, in terms of overall lifespan, wooden facade cladding is more advantageous, with a lifespan of at least 30 years.

Investment costs

The price of work for facade surfaces is given on the basis of the average from several offers of contractors. For wooden facade cladding it is €35/m^2 and for facade plaster it is €20/m^2.
After multiplying the unit price of the work with the area of the object, we got the total price for the work. The price of the work is lower when the facade plaster is implemented, while the difference between the wooden facade treatment is €9,967.65.

The following tables (no.1,2) are used to compare the costs for each facade. All materials used, their quantity and price are listed in the tables. The costs do not include the rental of scaffolding and the work of employees.

Material	Total area	Quantity in the package	Number of packages/pcs	Costs [€]
Mounting brackets	-	-	854	4 526,2
Waterproofing film DELTA-FASSADE 200 PLUS	664, 51 m^2	75 m2	9	4 590
Sealing tape DELTA-TAPE	356 m^2	20 m^2	18	792
Aluminum profile	356 m^2	-	143	3 575
Facade module (wooden board)	664, 51 m^2	-	148	30 142,16
Aluminum mesh against pests	64 m	-	64	562,36
UV protection	664, 51 m^2	10 l	13(10 l) 1(5 l)	2 232,8
			Total	48 448,52

Table 1 – Material costs for wood cladding
Source: Authors

Material	Total area	Quantity in the package	Number of packages/pcs	Costs [€]
Window and corner profiles	841 m	-	337 ks	734,66
Reinforcement mesh	735,91 m^2	55 m^2	14 ks	960,96
Adhesive squeegee Baumit ProContract	664, 51 m^2	25 kg	140 ks	1 904
Penetration coat Baumit Uniprimer	664, 51 m^2	25 kg	8 ks	640
Facade plaster Baumit StarTop	664, 51 m^2	25 kg	70 ks	4 610,2
			Total	8 849,82

Table 2 – Material costs for facade plaster
Source: Authors

A comparison of material costs points to facade plaster as a better option in terms of finances. The financial difference between the surface treatment of the facade is €39,598.7.

Integration into the surroundings

The buildings affected by this facade treatment will be located in a mountain environment. The use of natural materials such as wood is expected from this environment. When using wooden cladding, the so-called merging with the environment. In the case of choosing a

facade plaster, the opposite case can occur and the objects in the surroundings will be too prominent and disturbing for the surroundings. The ideal solution would be a combination of these two facades or a combination of different materials. This comparison will be considered by the investor.

Comparison based on:	**Wooden facade cladding**	**Silicone facade plaster**
the speed of construction	✓	
staff deployment		✓
service life	✓	
labor costs		✓
material costs		✓
integration into the surroundings	is not considered	

Table 3 – Comparison summary
Source: Authors

Conclusion

According to individual comparisons, it is not possible to clearly determine which facade material is the most suitable. Both wooden cladding and facade plaster have their advantages and disadvantages. Wooden cladding seems to be the best solution in terms of durability, where it is enough to apply a new coating against UV radiation if necessary. When considering the use of wooden cladding on the facade, the advantage is a faster construction method without a technological break, compared to facade plaster, the difference is 7 days. The price, which is five times higher compared to facade plaster, reflects the better durability and speed of construction of wooden cladding. And the deployment of workers in the implementation of a wooden facade is 5 times more than in the case of facade plaster. The investor will decide on the final surface finish after considering the given comparisons.

At the end of the article, table no. 3 in which all comparisons are summarized and the most advantageous choice of surface treatment corresponding to them.

In the following research, it is possible to expand the work to include the costs of future maintenance, which would be appropriate to generalize to a unit of area for various construction objects. The indicators processed in this way would be a suitable guide for the investor's choice of material solution.

This article was recommended for publication in a scientific journal Young Science by:
doc. Ing. Viera Somorová, PhD.

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Young Science

ISSN 1339-3189