ACADEMIA TEHNICĂ MILITARĂ

Universidad del País Vasco | Euskal Herriko Unibertsitatea

FACULTY OF ENGINEERING BILBAO
UNIVERSITY OF THE BASQUE COUNTRY

The mechanical behavior of the metal sheet facades

Realized by: Alexandra COMISARSCHI

Coordinator: Jesus CUADRADO

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1. Introduction

1.1. Abstract

Building construction is an ancient human activity. Human shelters were at first very simple and, perhaps, lasted only a few days or months. Over time, however, they began more durable and then spreaded, appearing the first city. The present state of building construction is complex, compared to what Romans and Egyptians had built. During a building's service life, costs can occur at three stages: design, construction and use and maintenance, where 75–80% of costs occur during the use and maintenance stage. Many architects and scientists are nowadays devoted to the optimization of new building components.

Metal, however has been an important material for the last decade and the concept of metal sheet facades has played a fundamental role on the building's performance, being a complex system to design, build and maintain.

1.2. Introductive information

1.2.1. The history of buildings and materials

Building construction is an ancient human activity. It began with the purely functional need for a controlled environment to moderate the effects of climate. Constructed shelters were one means by which human beings were able to adapt themselves to a wide variety of climates and become a global species.

Human shelters were at first very simple and, perhaps, lasted only a few days or months. Over time, however, even temporary structures evolved into such highly refined forms as the igloo. Gradually, more durable structures began to appear, particularly after the advent of agriculture, when people began to stay in one place for long periods. The first shelters were dwellings, but later other functions, such as food storage and ceremony, were housed in separate buildings. Some structures began to have symbolic, as well as functional, value, marking the beginning of the distinction between architecture and building.

The history of building is marked by a number of trends. One is the increasing durability of the materials used. Early building materials were perishable, such as leaves, branches, and animal hides. Later, more durable natural materials, such as clay, stone and timber, and, finally, synthetic materials, such as brick, concrete, metals and plastics were used.

The first communities large enough to be called **cities** appeared in the Bronze Age and were built with the clay available on the riverbanks. The packed clay walls of earlier times were replaced by those constructed of prefabricated units: mud bricks. This represented a major conceptual change from the free forms of packed clay to the geometric modulation imposed by the rectangular brick, and the building plans too became strictly rectangular.

4. Conclusion

1. Metal sheets on facades are a big improvement in today's arhitecture of the building, as they provide an unique aspect, but also a superior performance, which is the main purpose for using them.

2. Depending on the budget, single sheet can be used, but, for a higher protection and an improved performation, ventilated facades are recommended. They are design in such a manner that can help at the reducing of summer thermal loads, therefore the energy consumption due to air-conditioning system, and, in the winter, they manage to retain heat, resulting in savings in terms of heating.

3. The most common materials used for metal sheet facade are aluminium and stainless steel, as both of them have their advantages in terms of providing high quality, sustainable and cost-effective exterior. Yet, stainsless steel takes the honours for prestige, durability and strength. Its glossy finish makes it a highly attractive option for any built structure were the aesthetics of the result are important and its self-healing properties are ideal for minimising maintenance costs.

5. Acknowledgements

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6. References

[1] S.W. Dean, *Atmospheric Corrosion of Metals*, Edition 767, American Society for testing and materials, Baltimore, 1982, p. 35-42.

[2] Mohsen Mostafavi, David Leatherbarrow, *The life of Buildings in time*, 1993 Massachusetts Institute of Technology, Fourth printing, 2005, p. 1-2.

[3] A. Swenson, Pao-Chi Chang, 'Building construction'.

[4] M. Bilow, *International facades: CROFT- Climate Related Optimized Facade Tehnologies,* Architectural and the Built enviroment, 2012, Rotterdam, p. 232.

[5] M. Hegger, V. Auch-Schwelk, M. Fuchs, T. Rosenkranz, *Construction materials Manual,* Arhitecture, Switzerland, 2006, p. 144-150.

[6] A. Watts, *Modern Construction Handbook,* Ambra, 2016.

[7] blog.abcmetalroofing.com, T. Roose, October 31, 2012.

[8] M. Gayle, D. Look, J. G. Waite, *Metals in America's Historic Buildings,* DIANE Publishing, Washington D.C., 1992, p.6-15.

[9] www.granitech.com, 'Ventilated facades', 2007.