



**Simulate the mechanical behavior of a beam, which is supporting a facade**

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# 1. Abstract

This paper's name is "Simulate the mechanical behavior of a beam, which is supporting a facade" and is realized during the Erasmus internship at Universidad del País Vasco with the guidance of the professor Jesus Cuadrado. In the following pages you will be introduced in the subject of facades, in the software that I used to model the beam and you will see all the process that allowed me to do all the simulations on the behavior of the fastening beam of facade system of the Bilbao School of Engineering. The main purpose of the simulations was to discover the behavior of the beam, under three different loads. The results we were interested in were those of displacement and Von Mises stress.

# 2. Introduction

A **facade** is generally one exterior side of a building. In architecture, the facade of a building is often the most important aspect from a design standpoint, as it sets the tone for the rest of the building.

From the engineering perspective of a building, the facade is also of great importance due to its impact on energy efficiency, as they are devoted to the optimization of new building components. The use of facades during the last century has been an important step in energy saving control for buildings.

Facades play a fundamental role on the building's performance, being a complex system to design, build and maintain.

The aesthetic appearance has played an important role in facade evolution. Not only more materials are used nowadays, but the efficiency, design and shapes were taken to another level. More constructors have given up at the common facade and have adopted the new concepts, which suppose higher resistance standard and an unique appearance.

Studies have shown that having buildings use metal sheets in front of their facade can bring, in one study, 29% energy savings (Lighting estimated consumption in 1 year) and, in the second one, 45% energy savings (heating, ventilation, air conditioning). Depending on the location of the building (intensity of the external sun), solar irradiation can be decrease by 77.9%

## 6. Conclusions

I consider the results of analyzes to be acceptable and I think this fastening system of the facades is a good one. The model is a simple one, easy to achieve, and after the results of the analysis, it behaves very well at the load it is subjected to.

In the case of the outer beams, which are at the end of the wall, it would be advisable to fasten the facade in a symmetrical manner. This would reduce beam tension due to a single angular momentum.

## 7. References

- [1] <http://catiadoc.free.fr>
- [2] [https://en.wikipedia.org/wiki/Von\\_Mises\\_yield\\_criterion](https://en.wikipedia.org/wiki/Von_Mises_yield_criterion)
- [3] Graphical documentation about the facade project from EHU Building

## 8. Acknowledgements

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