

SMARTLSF – Adaptive Light Steel Frame Wall Panel for construction or renovation

Summary

In Portugal, the current economic scenario and devitalisation of the construction sector have triggered the need for new constructive solutions and edification methods. Over the recent years, the lightweight steel-framed (LSF) system has been proliferating not only at national level but also globally. This system, besides being widely implemented at national level, also presents a great potential for exportation, being a benefit for the Portuguese industry. In addition to new constructions, the advantages of the LSF system are also evident in retrofitting actions, currently one of the main trends in the construction sector. LSF construction may outperform the traditional heavyweight construction method with respect to prefabrication, edification process, constructive flexibility, quality of construction and sustainability. As an industrialized system, it benefits from high-quality production control and serial production.

Despite the constructive flexibility inherent to the LSF system and the potential to meet the diverse requirements of new buildings architecture projects or necessities associated with buildings retrofit, the ultimate goal is often achieved at the expense of large material waste or burdensome consumption of labour. Often, the dimension of the constructive elements in LSF is dictated by the commercial size of the steel profiles or dependent on segmentation of those profiles and subsequent connection. However, the range of cold-formed profiles lengths available on the market is limited, leading to extensive cutting, splicing and connecting operations. In addition to the environmental impacts associated with the production of construction waste, tool commercial profiles on-site damage the fluidity, construction economy and speed of erection characteristic of this system.

Within the scope of this project, the aim was to develop an innovative, cold-formed metallic profile that overtakes efficiently the limitations associated with the use of commercial profiles.

Unlike commercial static profiles, the steel profile developed is intended to be extensible. The final system, composed of these profiles, have the advantage of being dynamic in the three dimensions, facilitating their transport and installation/assemblage. The flexibility introduced by the extensible profiles allows the LSF elements to be easily adjusted to the particularities and design requirements, without the need for multiple cuts, connections between profiles or splices. Parallel to the development of the extensible profiles, composite components were developed, and integrated with the LSF structure, reducing the thermal bridges, allowing the extensibility in a second axis and to monitor the thermal and mechanical behaviour of the structure. Additionally, it is intended that the system developed also contribute to achieving high levels of functional performance, attenuating the possible drawbacks associated with the metallic profiles in this scope. Thus, the SMARTLSF project aimed to contribute to the sustainability, efficiency and economy of a constructive system in clear expansion.



Figure 1. Prototype built for testing in a real environment.

smartlsf

ADAPTIVE LIGHT STEEL FRAME WALL PANEL
FOR CONSTRUCTION OR RENOVATION

Project Reference

POCI-01-0247-FEDER-039955

Leading Institution

Sucorema – Subcontrato,
Fabricação e Reparação de
Máquinas Lda. (Portugal)

Partners

CATIM – Centro de Apoio
Tecnológico à Indústria
Metalomecânica (Portugal), UA –
Universidade de Aveiro
(Portugal), Itecons – Instituto de
Investigação e Desenvolvimento
Tecnológico para a Construção,
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Funding

COMPETE 2020, Portugal 2020

Period

2019-2022

Total

1 261 360.76€

CERIS

Coimbra Hub: 111 185.72€

Project Website

[https://www.itecons.uc.pt/
services/projects/91](https://www.itecons.uc.pt/services/projects/91)