



# 2023 Master internship at University of Cadiz



## TITLE

**Experimental and numerical analysis of the dynamic behaviour of a water-to-water heat pump in a real building.**

## LAB & PEOPLE

- Name of the hosting lab: **Thermal Engineering**
- General activities of the lab: **Analysis of the thermal performance of buildings**
- Website: <https://produccioncientifica.uca.es/grupos/7903/detalle>
- Number of staff / PhD: **10**
- Supervisor name and contact: **Francisco José Sánchez de la Flor** ([francisco.flor@uca.es](mailto:francisco.flor@uca.es))

## TOPIC OF THE INTERNSHIP

- Scientific context of the internship (max 20 lines)

Energy consumption in buildings is responsible for about 35% of final energy in developed countries. Due to this and the growing environmental awareness, energy saving measures in buildings are increasingly being promoted. One of them is the use of heat pumps for domestic hot water (DHW) heating.

This work proposes to analyse an existing installation in a real building from an experimental and numerical point of view in order to optimise its operation and draw conclusions applicable to future designs.

Keywords

Energy consumption in buildings

Heat pumps

Bibliography

- Estefanía Hervas-Blasco, Emilio Navarro-Peris, Jose Miguel Corber, Optimal design and operation of a central domestic hot water heat pump system for a group of dwellings employing low temperature waste heat as a source, Energy 2019, <https://doi.org/10.1016/j.energy.2019.115979>

- A. Del Amo, A. Martínez-Gracia , T. Pintanel , A.A. Bayod-Rújula, S. Torné, Analysis and optimization of a heat pump system coupled to an installation of PVT panels and a seasonal storage tank on an educational building. Energy and Buildings 2020, <https://doi.org/10.1016/j.enbuild.2020.110373>

- Tasks and duties entrusted to the student:

The student will have the opportunity to learn about the actual operation of a water-to-water heat pump.

He/she will be responsible for obtaining the performance curves for different conditions of use.

He/she will have to analyse the inlet and outlet temperatures of the hot and cold water streams, measure flow rates, as well as the energy consumption of the equipment.

Finally, with the experimental data collected, you will learn how to calibrate a numerical model that reproduces the behaviour of the equipment.

- Skills to be acquired or developed:

Among other skills he/she will develop the use of experimental equipment as well as the critical analysis of results.

## **PROFILE OF THE DESIRED STUDENT**

- Minimum level of study required: none
- Field(s) of study: heat transfer
- Scientific skills : none
- Language skills required : english

## **THE INTERNSHIP ASSIGNMENT:**

Desired duration of the internship (in months): 6

Desired Starting date of the mission: *(please indicate the level of flexibility) : total flexibility*

Indicative weekly schedule: *25h / week*

Remuneration : *No*

*Erasmus grant / Internship agreement: an internship agreement will be signed.*

*To SEA-EU students:*

*If you're interested please send your CV and letter of motivation to the scientist in charge, email : [francisco.flor@uca.es](mailto:francisco.flor@uca.es) before the 01/oct/2023.*