

Boosting CFD Simulation of Thermal Equipment for Food Processing

Organizations

TACORE is a Spanish industrial manufacturing SME specialized in canning technologies.

SDEA Engineering is a Spanish consultancy SME specialized in mathematical modelling.

ANFACO is a Spanish private non-profit business association in the marine and food industry.

FEUP is the Mechanical Engineering Department of the University of Porto.

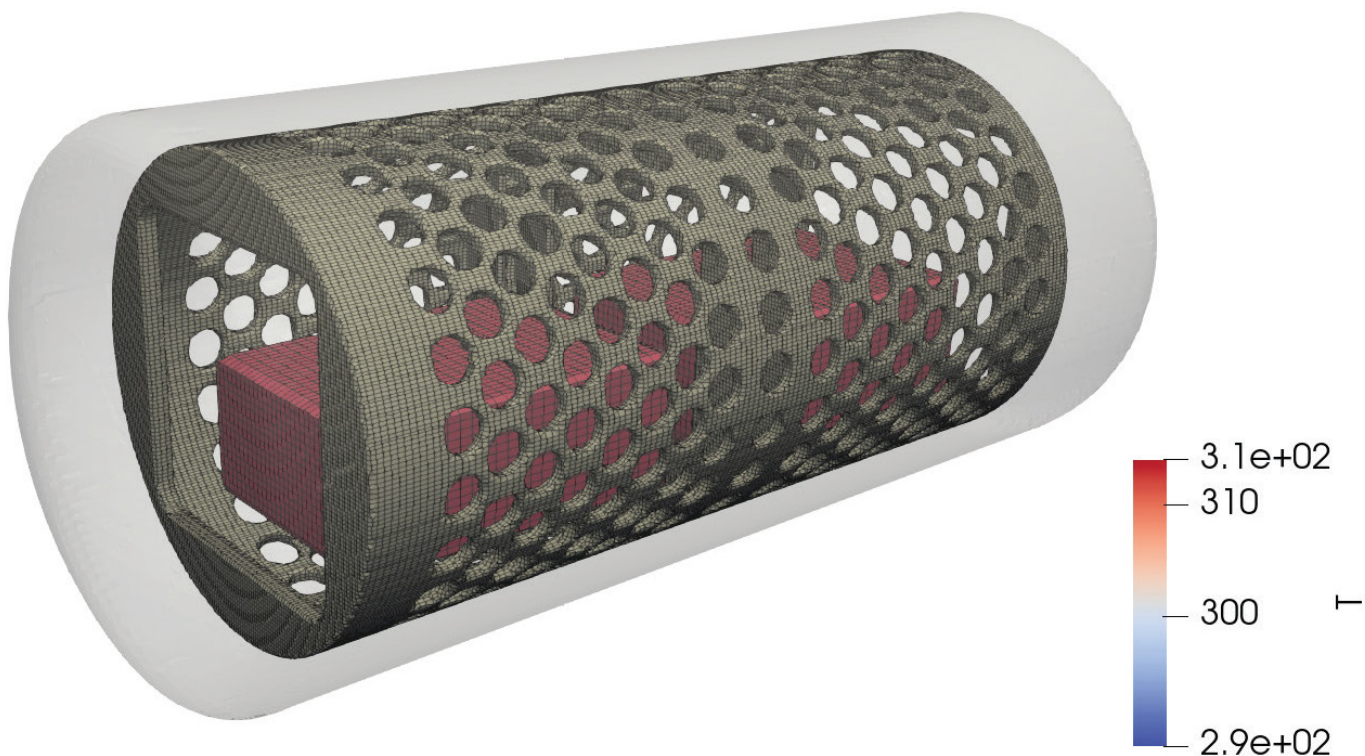
CESGA is a public foundation that provides HPC services.



CESGA is part of the Spanish NCC.

The Challenge

The canning industry in Europe, particularly in Spain and Portugal, is economically valuable. Thermal sterilization in autoclaves for canned food is energy-demanding and its improvement can reduce energy consumption and CO₂ emissions, resulting in cost savings. Specialized personnel are needed for fluid-thermal simulation engineering. The challenge is to develop a specialized tool using HPC, offering new competencies and opportunities for companies.





Industry Sector
Manufacturing

Technology used:
**HPC,
CFD Simulation**

The Solution

An easy-to-use tool was developed for simulating thermal sterilization processes in autoclaves. This tool stands out by its ease of use and user support, which eliminates the need for general purpose simulation tools and personnel highly qualified in thermal simulations.

The tool is a complete SaaS including the HPC resources and is offered to customers as a subscription with all services included. The solution consists mainly of two parts: the simulation model developed using OpenFOAM and executed on the HPC platform and the WEB GUI interface.

Without HPC, running simulations would take 3-5 hours for each simulation, too long to fit well into the business workflow of the targeted end-users. The use of HPC allows simulations to be carried out in more detail and in less time (5-15 minutes per simulation) enabling end users to find out their optimal recipes in a short time and also enabling TACORE to investigate different design options before manufacturing.

The Impact

TACORE will have a market advantage with more efficient and customizable manufacturing. The cost reduction to develop an autoclave will facilitate the replacement of obsolete equipment leading to yearly savings of €40,000.

Two customers of SDEA in the automotive industry are interested in similar simulation tools. These opportunities involve the incorporation of a specialized profile for the development and support of SaaS.

Furthermore, the experiment simulations and analysis will provide detailed information on a machine's energy consumption and detect if it is possible and worthwhile to intervene to reduce it, achieving a smaller carbon footprint.

FEUP will present the tool to students as a showcase for possible energy optimization applications. They can use this tool to gain knowledge about CO₂ emission savings. FEUP can also present the tool to companies.

For ANFACO, this is an opportunity to offer the new tool: the industries that apply this new service in their production processes will face a business benefit, in terms of their energy savings and reduction of CO₂ emissions.

Benefits

- TACORE estimates a reduction in production costs of 23% in the cost of an autoclave resulting in an annual benefit of 2.7% in the annual turnover.
- For ANFACO members, a 2% improvement in efficiency saves 0.00187592 tCO₂/tonne of product.
- SDEA estimates an annual revenue of €40,000-60,000 for the development of custom applications.