

TotalEnergies Fluids CFD simulation to optimise performance

TotalEnergies Fluids entrusted Cetim with the task of studying the benefits of adding a pre-distribution tray and determining the impact of twisted stacks on the fluid distribution of a hydrogenation reactor in the United States.



©TotalEnergies Fluids

OUR CUSTOMER

Corporate name
TotalEnergies Fluids

Workforce
200 people (2023)

Turnover
EUR 505 million (2022)
2 sites: Oudalle (France) and
Bayport (United States)

Business activity
The Special Fluids Division of TotalEnergies is a leading player in the design, production and marketing of high-purity, biodegradable hydrocarbon solvents. These special fluids are sold in over 70 countries and are used in applications ranging from cosmetics and water treatment to plant protection products, drilling fluids, tyres, inks and paints.

A high performance CFD simulation tool, capable of quickly providing the most accurate calculations possible, is not enough. “You need to have a thorough understanding of the various phenomena involved: aeraulic, hydraulic and thermal factors, in order to be able to analyse and interpret the results in relation to the problem being studied”, stated Ilyes Mnassi from Cetim. With regard to the task entrusted to Cetim by TotalEnergies Fluids, involving the equipment of a hydrogenation reactor at its Bayport site (United States), while the calculations were rapid, it took several months to determine the model to

be studied. “We had to find the most appropriate model for the desired performance based on the physical characteristics of the most commonly used fluid”, explained H el ene Leroy, Head of Processes and Projects at TotalEnergies.

Many interactions

There were many interactions between Cetim and the Head of TotalEnergies Special Fluids Department. These related to defining the scope of the study as well as bibliography and other work. During the course of the study, the stacking of balls proved to be a closer model than the initially favoured porous medium, which meant that new calculations had to be performed. “Cetim was pro-active and provided strong recommendations, stated Antoine Salomon, Head of Process Support Projects at TotalEnergies. Our interactions with the experts made it possible

to find new avenues.” The study revealed that neither the number of twisted stacks nor their location on the second distribution tray affected homogeneous flow. “We now know that the origin of the malfunction lies elsewhere, pointed out Antoine Salomon. Cetim saved us time and money by sparing us the need to shut down and drain the reactor to carry out repairs that were ultimately not necessary.” In addition, as a result of a previous study carried out by Cetim for the Oudalle site in France, TotalEnergies Fluids demonstrated to US operators the need for a pre-distribution tray to enable more homogeneous flow. “The results (+ 14 % improvement) convinced them that the investment was worthwhile, pending validation of a new technology”, commented H el ene Leroy.

Cetim's asset

Thorough understanding of computational fluid dynamics and the optimisation of equipment. As part of its HyMEET (Hydrogen Material and Equipment Engineering and Testing Center) project, Cetim provides industrial manufacturers with support for the technological changes required by the use of hydrogen.

