



CASE STUDY /

## Ansys + Zeleros

“The extensive use of simulations using Ansys software, including electromagnetics, mechanical, and fluid dynamic problems; has allowed Zeleros to develop a design solution to its concept in a faster and more economical way than relying only on experimental test validation.”

**Federico Llesma**

Dynamics Lead / Zeleros

### Hyperloop, the fifth means of transportation.

The leader in engineering simulation, Ansys, accompanies Zeleros in the race to develop the transportation of the future.

Hyperloop is a new transport concept that consists of moving a levitating vehicle inside a sealed tube with a low-pressure environment so that air friction can be reduced allowing high-speed travel.

By integrating the main technologies of aerodynamic propulsion and magnetic levitation of Zeleros in the vehicle, the needs of electrification of the infrastructure are reduced, which reduces costs and complexity, and facilitates maintenance. This system allows a solution for long-distance travel at 1000 km/h.

In addition, the fully autonomous vehicle allows the use of a tubular infrastructure which reduces the cost of construction and maintenance compared to other high-speed land transportation systems.

This new form of transportation combines the best performance of the aeronautical industry with the best performance of the railway industry and connects the world in a matter of minutes. This technology will revolutionize the transport sector, significantly reducing the time of travel which has an added value for transporting people and goods.



Zeleros' hyperloop vehicles (pods) are designed with scalability and safety in mind.

### / Challenges

The ultimate goal of Zeleros is to be able to connect all the cities as if they belonged to a large metro network and achieve a more efficient, faster and sustainable method of transportation.

But there is still a long way to go before they can reach that goal. The first litmus test of this adventure is to develop a test scale model with the aim of checking if the prototype is capable of reaching 500 km/h proving the viability of the technology.

Although the road is long, Zeleros is not alone in its journey. The Spanish company has the support of leading companies in their respective industries. Interested in participating in the Zeleros project is the leading company in engineering simulation Ansys.

Since its foundation, the Spanish company has relied on Ansys simulation to develop the most reliable prototype possible, in the fastest and most economical way.

### / Engineering Solution

Thanks to Ansys Maxwell for the electromagnetic simulations, Ansys Mechanical for Finite Element Analysis, and to Ansys Fluent for CFD solutions; Zeleros can analyze the mechanical and magnetic behavior of its active magnetic levitation system and the dynamic behavior of its aerodynamic propulsion system.

Subsequently, with the Ansys Workbench platform, Zeleros can connect the different products and obtain multiphysics simulations that allow advanced knowledge of whether the different approaches applied during the design phase move in the right direction without needing all the costly elements that are required for real testing.



Zeleros' hyperloop infrastructure seamlessly integrates with the environment reducing costs per kilometer and maintenance.

### / Technology Used

- Ansys Mechanical
- Ansys Fluent
- Ansys Workbench
- Ansys Maxwell

### / Benefits

The benefits encountered during the simulation process are multiple.

On the one hand, Ansys solutions allow Zeleros engineers to identify positive ideas, and discard unsuccessful ideas in the preliminary design phase, which reduces time spent in the development phase. By simulating perfectly-sized components before building and testing them, Zeleros can uncover reasons for failure and prevent future failure from occurring.

On the other hand, they can obtain several reliable designs that will be finally tested in the real world. This capability is essential in an industry where the materials are very expensive and the components difficult to produce.

Thanks to the simulation, the company achieves its objectives in a faster and less expensive way. This is essential in a fast-moving industry that forces companies to be at the forefront of innovation.

Zeleros is dealing with problems that not many had faced before in this industry. There are only limited models or antecedents available on which it can be based, and for this reason they must use numerical simulation combined with real-life testing, which will undoubtedly be the key to achieve its objectives in a faster and more profitable way.

## **/ Company Description**

Zeleros is the Spanish company based in Valencia that seeks to lead the development of a new method of sustainable high-speed transport in Europe, inspired by Hyperloop technology.

The company was founded in November 2016 by Daniel Orient, David Pistoni and Juan Vicén, three students from the Polytechnic University of Valencia who, after defending their Hyperloop UPV model in the SpaceX 2015 international competition with two other university colleagues and winning the prize for the Best Concept Design and the Best Propulsion Subsystem, decided to take a step forward and embark on the adventure of developing a more sustainable and efficient means of transport.



Zeleros' hyperloop stations will be located in the city centers with a quick passenger boarding process.

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