

Centro Ricerche Fiat

Automotive

Italy

www.crf.it



ANSYS® CFX®
ANSYS® ICEM CFD™

Overview

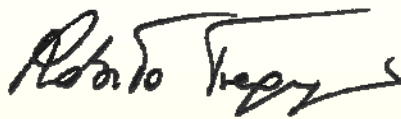
Fiat considers the Panda MultiEco to represent the future of environmentally-friendly cars. Introduced during the 2006 Geneva Motor Show, this concept car exhibits leading technology to reduce emissions and decrease fuel consumption by combining an innovative 'powertrain' architecture, the use of eco-compatible materials for the exterior and interior, and aerodynamic improvements and optimization.

These solutions were developed within the Fiat Group (Fiat Auto, Fiat Powertrain Technologies, and Centro Ricerche Fiat) and will bring great benefits to consumers. Thanks to lower fuel consumption and the use of low-cost methane, the Panda MultiEco reduces relative cost per kilometer by an impressive 63%.

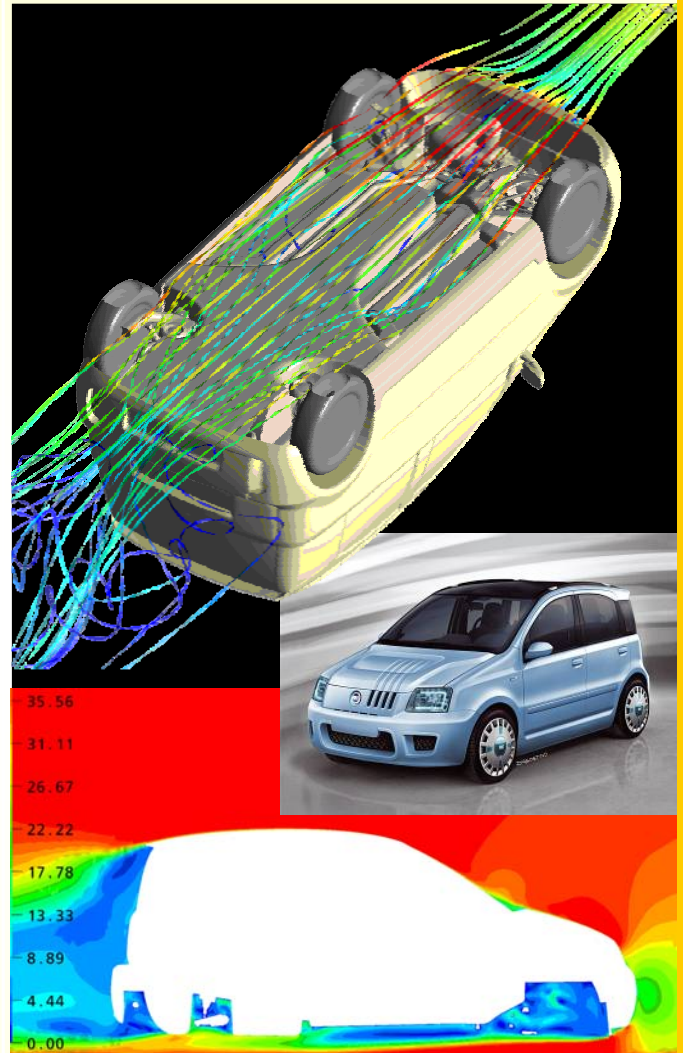
The aerodynamic studies of the Fiat Panda MultiEco were performed by Centro Ricerche FIAT (CRF), an industrial organization whose objective is the promotion, development, and transfer of innovation to provide a competitive advantage to clients and partners.

Testimonial

"Virtual simulations performed with ANSYS CFX played a fundamental role in supporting engineering decisions during the project. Moreover, using CFD allowed us to save time and money by avoiding the prototyping and testing costs that would have been incurred for experimental investigations in an aerodynamic wind tunnel. The use of ANSYS CFX during the design cycle of the fuel-efficient Fiat Panda MultiEco was instrumental in allowing the team to reach the aerodynamic goals."



R. Tregnago
Head of Aerodynamic and Aeroacoustics
CRF Vehicle Division



Challenge

For this project, the goal with regard to aerodynamics was to achieve a drag coefficient for the Panda MultiEco that was lower than the standard Panda vehicle. The design concept for the MultiEco was based on the Panda 4x4, because the height of the 4x4 more easily allowed the introduction of methane (CNG - Compressed Natural Gas) tanks in place of differential and rear wheels power train shafts. However, the Panda 4x4 has the highest drag coefficient of the entire Panda family, therefore reaching the target reduction was quite challenging.

Solution

Computational grids were generated with ANSYS ICEM CFD software. The cases were run using grids consisting of several million tetrahedra and prisms. CFD simulations of underbody components using the ANSYS CFX product focused on highlighting and reducing the most significant contributors to aerodynamic drag. The results were useful in designing fairings, shields, and a rear diffuser. The huge amount of CFD analysis throughout the vehicle development process also allowed the definition and refinement of details like the rear spoiler and front bumper.

Benefits

ANSYS ICEM CFD was able to model the complex geometry of the underbody of the Panda MultiEco.

Using ANSYS CFX software, important reductions in drag were obtained both on the underbody and on the rear car body

The absolute drag coefficient met the desired value and allowed the team at Fiat to develop one of the world's most fuel-cost efficient vehicles.