GREEN TECHNOLOGY ACCELERATOR CENTER

CASE STUDY

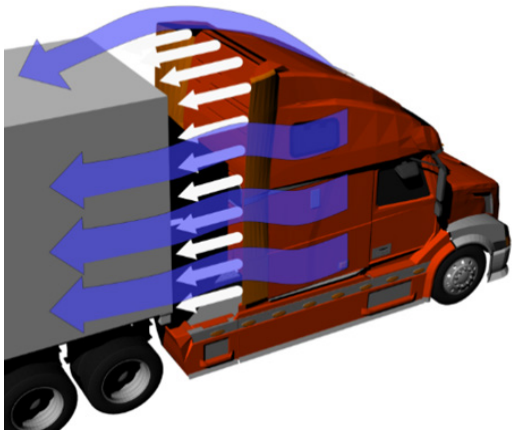
NYSP2I Performs Evaluation of Synthetic Jet-based Flow Control for Transportation Applications

Actasys was founded in 2013, developing active flow control to improve the aerodynamic performance of ground transportation vehicles. Actasys is located in Watervliet, New York and focuses on the development and commercialization of their groundbreaking Synthetic Jet-based flow control technology, emerging from the aerospace industry.

CHALLENGE

Actasys' mission is to become the world's most advanced private research and development organization for aerodynamics, and specifically for active flow control. Actasys' Synthetic Jet-based Flow Control system decouples the aerodynamic performance from the actual shape of objects by changing the way air and objects interact, with the intent to reduce the aerodynamic resistance of the object. When applied to tractor-trailers, this reduced aerodynamic drag force can result in increased fuel economy and reduced CO2 emissions for trucking fleets.

Currently Actasys is developing a system retrofit technology for Class 8 trucks that has the potential to significantly impact the trucking industry. Actasys requested NYSP2I and Rensselaer Polytechnic Institute (RPI) to test new system configurations and actuation methods of its product, quantifying the energy & environmental impact of their Synthetic Jet-based Flow Control System as applied to tractor-trailers.



Actasys Synthetic Jet-based Flow Control - Gap Unit Location

SOLUTION

New York State Pollution Prevention Institute (NYSP2I) worked together with Rensselaer Polytechnic Institute (RPI) to support Actasys with a wind tunnel evaluation and performance analysis for new configurations and actuation methods of their Synthetic Jet-based Flow Control system "Gap Unit", as applied to the space between the tractor and trailer.

CHALLENGE

- Actasys requested a product performance evaluation of their Synthetic Jet-based Flow Control System, quantifying the impact on aerodynamic drag, energy use & CO2 emissions as applied to tractor-trailers

SOLUTION

- NYSP2I teamed with RPI engineers to evaluate the Synthetic Jet-based Flow Control system Gap Unit performance as applied to a scale tractor-trailer model in RPI's wind tunnel when actuated with Actasys' advanced control strategies
- A parametric study was conducted to help optimize the benefits of system operational parameters, quantifying the impact on aerodynamic drag force, fuel economy and CO2 emissions

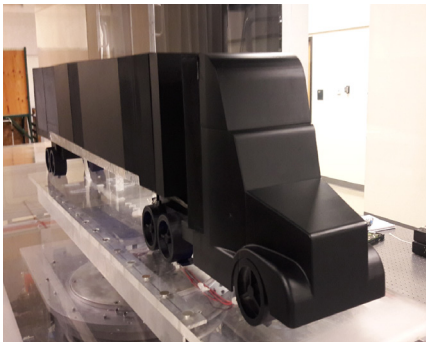
RESULTS

- The Actasys Synthetic Jet-based Flow Control system demonstrated a measurable reduction in aerodynamic drag as recorded in the RPI wind tunnel as applied to a scale tractor-trailer model with synthetic jets active vs. inactive (baseline)
- The Actasys Synthetic Jet-based Flow Control system, using advanced control strategies, produced a significant reduction in aerodynamic drag more than 46.7% higher than obtained when using conventional control strategies
- RPI wind tunnel testing indicates that the Actasys system has potential for significant improvements in both fuel economy and CO2 emissions when applied to tractor trailer fleets
- Detailed results are available from Actasys upon request

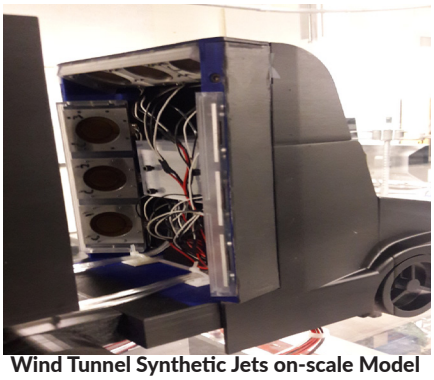
ACTASYS

- NYSP2I teamed with RPI engineers to evaluate the Synthetic Jet-based Flow Control system Gap Unit performance, quantifying the impact on aerodynamic drag force, fuel economy and CO2 emissions.

- A parametric study was conducted in RPI's wind tunnel facility with Actasys' Gap Unit system installed on a scale tractor-trailer model to help quantify and optimize the benefits of various system operational parameters.



Scaled Wind Tunnel Model



Wind Tunnel Synthetic Jets on-scale Model

RESULTS

The worked performed by NYSP2I and RPI resulted in key findings from the performance and environmental evaluation of Actasys Synthetic Jet-based Flow Control system.

- The Actasys Synthetic Jet-based Flow Control system demonstrated a measurable reduction in aerodynamic drag as recorded in the RPI wind tunnel on a scale tractor-trailer model with synthetic jets active vs. inactive (baseline).

- A further significant reduction in aerodynamic drag of 46.7 % was achieved when Actasys' advanced control strategies were applied to their system as recorded in RPI's wind tunnel, as compared to the initial drag reduction using conventional control strategies.

- Based on the maximum drag reduction measured with the Actasys Synthetic Jet-based Flow Control system activated on tractor-trailer applications, there exists potential for significant improvements in both fuel economy and CO2 emissions.

TESTIMONIAL

"NYSP2I performed an effective and rigorous evaluation of our technology, partnering with the Rensselaer Polytechnic Institute to leverage its advanced facilities and wind tunnel testing capabilities. The independent evaluation demonstrated the significant amount of fuel savings provided by Actasys technology and proved how a new control methodology devised by Actasys can lead to fuel savings that are almost double than what is currently provided. This independent evaluation was extremely valuable and helped Actasys to structure its future strategic development. We are looking forward to working again with NYSP2I in the future."

– Daniele Gallardo, Ph.D.,
VP of Business Development
Actasys, Inc.

NYSP2I PARTNERS

R·I·T Rensselaer

University at Buffalo
The State University of New York

Clarkson UNIVERSITY

New York Manufacturing Extension Partnership

Funding provided by the Environmental Protection Fund as administered by the New York State Department of Environmental Conservation.

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