

Ansys is the global leader in engineering simulation software and services widely used by engineers, designers, researchers and students across a broad spectrum of industries and academia, including aerospace and defense, automotive, electronics, semiconductors, energy, materials and chemical processing, turbomachinery, consumer products, healthcare and sports.

Engineering simulation is the application of physics-based software solutions across the product lifecycle from ideation, to design, manufacturing and operation, enabling engineers to virtually test operational performance and predict how product designs will behave in real-world environments. Applying engineering simulation solutions significantly reduces cost, shortens time to market and reduces risk of failure by improving product quality.

Ansys is committed to the conservation and sustainability of the planet's resources by operating our business in ways that reduce our environmental impact and carbon footprint. As part of Ansys' environmental sustainability efforts, we submit to the Carbon Disclosure Project (CDP) annually and are committed to taking steps to measure and mitigate the carbon footprint of our operations.

As the global leader in simulation software, Ansys is well positioned to also provide technology solutions that support and enable the sustainability goals of our customers across diverse industries. *Our solutions can have a positive impact on the environment by helping our customers* to reduce their use of resources while increasing their efficiency and productivity. Discovering and implementing efficient means of innovative product design and operation — with minimal use of physical resources — is at the very heart of our vision of pervasive simulation.

While measuring and reducing our own environmental impact is essential, the benefits from this process are finite. By contrast, our **product handprint** — the use of simulation by customers to reduce their own carbon footprint and the footprint of their products — is nearly infinite. Here we present one in a series of use cases illustrating how Ansys simulation creates these handprint benefits.





Climate change is reaching alarming levels due to heavy global carbon emissions of CO_2 , which have nearly doubled⁽¹⁾ in the past 50 years to ~49 gigatonnes in 2016.⁽²⁾ The transportation sector is responsible for approximately 22% of energy-related emissions,⁽³⁾ with 12% of that amount attributed to aviation, accounting for about 1.0 gigatonnes of CO_2 equivalents $(GtCO_2e)$.⁽⁴⁾Commercial companies now launching rockets into space also add to the emission total.



GRAND CHALLENGES / IN AEROSPACE EMISSIONS REDUCTION

The challenges facing the aviation industry in its effort to reduce CO₂ emissions have been well-documented. They include:

- · Making aircraft more aerodynamic to reduce drag
- · Reducing aircraft weight (lightweighting) to decrease the amount of fuel burned
- · Making the propulsion system more efficient, again to reduce the amount of fuel required

ANSYS SIMULATION / SOLUTIONS APPLIED TO OVERCOME THESE CHALLENGES(5)

	Efficiency Gain	Industry Cost Reduction
Aerodynamics	4.5% Drag Reduction	\$10B Saved in fuel consumption due to winglets
Light Weighting	18% Weight Reduction	\$1.3B Saved for each 1% reduction in mass
Propulsion	75% Fuel Burn Reduction	\$27B Saved from 15% reduction in fuel burn

SIMULATION / THE SOLUTION TO AEROSPACE'S GRAND CHALLENGES

Aerodynamics

Wing and fuselage design has a considerable impact on drag and aerodynamics.

- AS Sailplanes has reduced wing surface of its gliders AS 33 by 4.7% using Ansys simulation software⁽⁶⁾
- Ansys simulation has helped place aircraft antennas inside the fuselage to improve aerodynamics and fuel consumption

Light Weighting

Materials selectrion, such as composite material (e.g. CFRP) and additive manufacturing are key to reduce weight, improve fuel efficiency and increase cost savings.

- Ansys has helped Carbon Freight to design 18% lighter cargo pallets for aircraft⁽⁷⁾
- Material management systems provided leading engine manufacturer benefits of ~\$10 million per year through a more efficient use of materials^(a)



"Simulation via Ansys has saved **50 percent** in development time andhundreds of thousands of dollars in physical testing"

Glenn Philen

CEO - Carbon Freight

Propulsion

Simulation helps to improve efficiency of engines and is crucial for the development of new engine classes.

 Improving engine efficiency by 1% can reduce GHG emissions by more than 350,000 tons per year⁽⁹⁾

References

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