



success story



ESTECO
ACADEMY

M-Fly. The University of Michigan Team at SAE Aero Design Competition

Long, freezing winters in Michigan leave the M-Fly team with only a month and a half to design and test their plane for the SAE Competition. Thanks to modeFRONTIER, the team can save precious time and improve their design.

The **SAE Aero Design Competition** was created to connect engineering students with real-life engineering experiences and prepare them for their professional paths.



modeFRONTIER allows us to explore a much larger design space in significantly less time than we could do by ourselves.

As of this year, the M-Fly team participates both in the regular and the advanced class of the Competition. The 2016/2017 regular class objective is to maximize the amount of “passengers” on the plane without leaving empty seats - a realistic challenge faced by commercial airliners. The advanced class includes the design of the internal combustion power, static and dynamic payloads that must be dropped on a target during the flight, as well as the use of sensors and other electronic systems. **M-Fly has partnered with ESTECO Academy and will benefit from free training and access to modeFRONTIER optimization platform to improve their aircraft design and validate analysis results faster.**

Unlock the potential of your engineering projects whether you are learning or teaching. Choose from the three membership plans available: Student, Researcher or Professor.

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At M-Fly, our goal is to teach aerospace engineering, specifically aircraft design through competing at the SAE Aero Design competition. We balance winning and teaching, so we try to involve as many interested University of Michigan students in our project, while still designing the best aircraft for the competition.

However, our design cycle is brutal as we have two major factors against us: our school year and the weather. If we want to finish the testing phase before we head to competition, we need to get to the final design by Thanksgiving and finish the construction in January: a very tight schedule. In Michigan, from December through March the temperature highs are hovering at freezing temperatures and opportunities for prime weather conditions to flight test are minimal. If we get lucky, we can perform a flight test or two before we head off to competition which is in the much nicer Southern United States (the competition rotates between Florida, Georgia, and Texas). The more time we have with a full aircraft built, the bigger are the chances of us getting more test flights in. That is where modeFRONTIER comes into play - it allows us to

explore a much larger design space in significantly less time than we could do by ourselves. Just the Design of Experiments (DOE) runs give us more data that we have ever gotten in our past design cycles in terms of different configurations.

We are currently using modeFRONTIER to do two things: iterate through many different configurations to optimize and do multi-disciplinary analysis since it interfaces so well with other analysis and CAD software we have here at Michigan such as ANSYS, StarCCM+, and SolidWorks. Instead of a standard design, analyze, build, test, go back to first step and repeat - design cycle, we can multiply the iterations for each step: design x 10000 -> analyze x 10000 -> downselect design -> build -> test and repeat the last 3 steps, with the first 3 steps taking only a couple hours if needed. modeFRONTIER also has a superb post processing capability that allows us to analyze our results in many different ways to make sure we are choosing the right design, as well as provide insights into our design problem.

Beldon Lin,
M-Fly team member

Learn more about the **ESTECO Academy Membership** including modeFRONTIER license and access to the online learning portal an onsite training.



M-FLY TEAM @ UNIVERSITY OF MICHIGAN

M-Fly is a Society of Automotive Engineers (SAE) Aerospace Design team at the University of Michigan. It is dedicated to promoting opportunities for students to practice applying their knowledge to aerospace projects outside the classroom. Students of all majors and standing are welcome to join the team. M-Fly competes in the Regular Class SAE Aero Design Competition annually and in the Advanced Class since 2016. The competition is based on three judged portions: a written design report, an oral presentation, and a flying stage.

umich.edu/~mfly

ESTECO Academy

ESTECO Academy is an innovative community of practice built around **Design Optimization** and the modeFRONTIER multidisciplinary optimization platform. With a rich collection of media and training material and a complementary calendar of events, it supports students and researchers who wish to learn about optimization in engineering.



About ESTECO

ESTECO is an independent technology provider that delivers first-class software solutions aimed at perfecting the simulation-driven design process. With more than 15 years' experience, the company specializes in customer-focused solutions for **numerical optimization, CAE integration, process automation** and **simulation data management**, and supports over **250 international organizations** in designing better, more efficient products across a wide spectrum of industrial sectors.

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