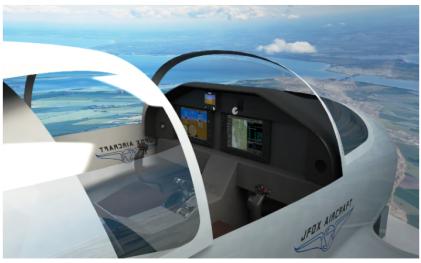
Where Dreams Take Flight—Designing Clean, Energy-Efficient Aircrafts with SOLIDWORKS

An aviation enthusiast since he was young, Mr. Jettanakorn Pengsiri, founder of JFox Aircraft Co., Ltd. in Thailand, had always dreamt of building an aircraft of his own and taking to the skies. While working as an aircraft systems engineer, Jettanakorn decided to put his years of experience in designing aviation systems and aircraft maintenance to good use, by building his first plane – the two-seater JX-200RG Sport Thunder High-Performance five years ago.



Initially intending to use it as a hobby aircraft, Jettanakorn, in the process, discovered huge market potential for smaller experimental aircraft, especially in the United States. This eventually led to the inception of his company, JFox Aircraft in 2013, which today builds aircraft kits of the JFox Sport Thunder for aviation hobbyists around the world. The company also supplies different products and services for the aviation, aerospace, and defence industries.

A cleaner, more efficient way to fly

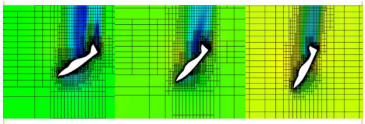
Conventional aircraft engines are not only noisy, but also cause high carbon emissions and are difficult to maintain due to the number of moving parts. Furthermore, jet fuel's high cost and volatile price fluctuations add up to high operating costs. Inspired by electric-powered unmanned aerial vehicles (UAVs), Jettanakorn took it upon himself and his JFox team to develop an electric-powered airplane – the "Freedom of the Skies" or JFOX JX-200E-RG Sport Thunder electric aircraft. His vision was to create an environmentally-friendly, high-performance aircraft with lower operating costs and lower noise pollution.

One of the biggest problems was finding a suitably powerful, long-lasting yet light enough battery. Fortunately, with continual innovation in the electric vehicles (EV) industry, electric batteries today can achieve 98 percent of the performance of conventional vehicular engines, and are able to run for longer periods of time without adding too much to the vehicle's size and bulk.

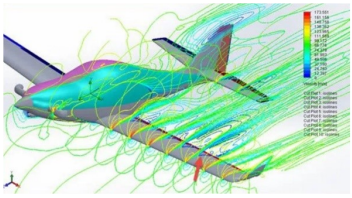
Aircraft testing and simulating — digitally

Another challenge was trying to design, build mock-ups, and test the aircraft while keeping costs low. To do this with different design mock-ups in various conditions would have been prohibitively expensive and time-consuming for a startup like JFox.

However, with the help of Dr. Pongwit Siribodhi of Kasetsart University, the JFox team chose to integrate the SOLIDWORKS software in every step of the design-to-manufacture process. The software's agile 3D technology proved crucial to this type of precision engineering. Most importantly, the software's ability to simulate the performance of different aerodynamic designs in a vast array of situations meant huge time and cost efficiencies.



	Resultant Force (N)
29 deg (Flat)	6.113
45 deg (Oblique)	7.361
60 deg (Steep)	6.432



Using SOLIDWORKS software, Dr. Pongwit and the JFox team were able to develop various conceptual 3D designs of the aircraft. They were able to put the designs through CFD Flow Simulation to test and analyze the aerodynamic properties and performance of the 3D model. After this, they used 3D printing to produce accurate prototypes of the aircraft components for actual testing at Kasetsart University's Aerospace Engineering department lab.

The entire process helped to reduce aircraft development time by more than 60 percent, and the integration of software modeling with 3D printing also meant more precise and accurate prototypes.

Fully integrated design and simulation process

While we don't expect to see the "Freedom of the Skies" soaring through the skies anytime soon until it completes mandatory testing and goes into production in a couple of years, the JFox team continues to believe in the value of integrating software into their design, simulation, and production process.

In preparation for the aircraft's eventual flight testing, the team has developed a digital flight simulator. This simulator, when combined with other technologies such as augmented reality (AR), virtual reality (VR), artificial intelligence (AI) and rapid prototyping (RP), aims to mimic real-world test conditions while improving the safety and efficiency of the testing process.

Until then, Jettanakorn and the JFox team continue to work on new ways of improving on their aircraft designs and hope to eventually realize Jettanakorn's dream of travelling the world in clean, energy-efficient electric aircrafts.

For more information on JFox Aircraft, please visit their website: **http://www.jfoxaircraft.com**

JFox Aircraft worked with AppliCAD, a SOLIDWORKS Value Added Reseller based in Bangkok, Thailand, offering CAD/CAM software to a wide range of customers throughout Thailand. For more information on NCCS, please visit: **https://www.applicadthai.com/**

SOLIDWORKS

Dassault Systèmes SolidWorks Corp. offers complete 3D software tools that let you create, simulate, publish, and manage your data. SolidWorks products are easy to learn and use, and work together to help you design products better, faster, and more cost-effectively. The SolidWorks focus on ease-of-use allows more engineers, designers and other technology professionals than ever before to take advantage of 3D in bringing their designs to life.