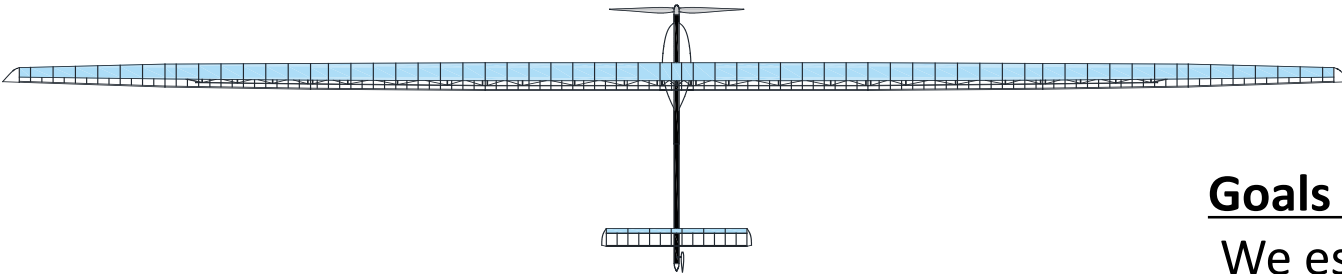


Windnauts Annual Activity 2020

Who we are

Our club Tohoku Univ. "Windnauts" has been designing, producing, and flying human powered airplanes (HPA) since 1993. We've been competing in the TV program "Birdman Rally", and we have a record of five championships in the past.



What kind of airplane is HPA?

HPAs are designed for unmatched efficiency. The wing is quite wide and the airframe is incredibly light, which leads to extremely less drag. Our HPA has 104 ft wide wing and weighs 72 lbs. It requires only 0.3 horsepower at 17 mph cruise speed.

Goals and Means of Windnauts 2020 Project

We established a record of 36 km (22.4 miles) of flight distance in 2008, but the record was broken by the other teams in 2017, 2019. Our goal in 2020 is to regain it, which means to fly more than 38 km (23.6 miles). For this it is necessary to enhance the flying skills of the pilot. We decided to build the HPA faster and allow enough time for flight training. We have succeeded in managing the production schedule while maintaining production quality. **1**

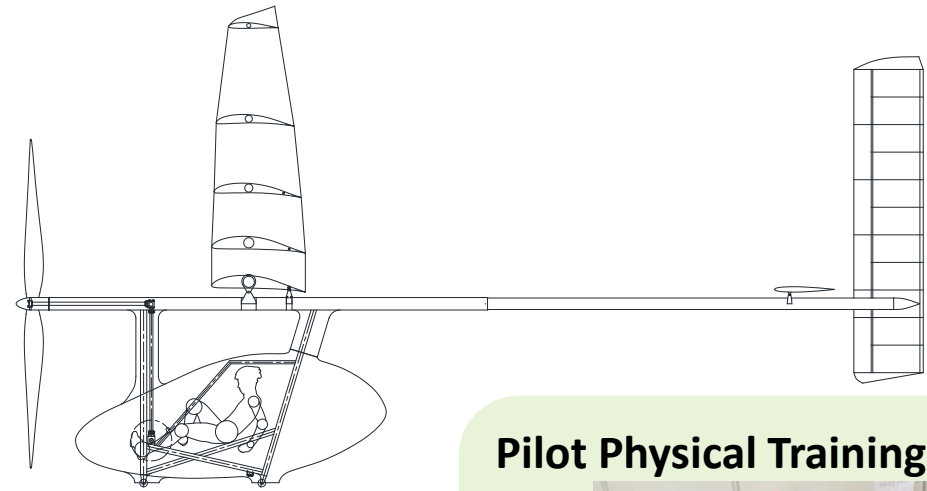
Designing

Production

Test

Features of the HPA model “SUN (燦)”

- ✓ Increased wing loading (smaller wing area)
 - ➔ More tolerant of gusty conditions
- ✓ Refined airfoils and wider wing
 - ➔ Less drag and more range, or higher speed
- ✓ Large area empennage and rigid airframe
 - ➔ Highly controllable in rough wind



Frame Mock-up Fit Check (Sep. 2019)
Confirmed that the frame fits for pilot's position and its design was appropriate.



Material Strength Test (Sep. 2019)
Acquired CFRP strength for safe structural design, also checked making procedure of spar.

Pilot Physical Training



The pilot trained hard using ergometer and managed his food and weight strictly.

Designing



▲ **CFRP Tube Production** (Aug. ~ Dec. 2019)
The airplane mainly consists of ~120 CFRP tubes. While some of HPA builders buy them from manufacturers, we make by ourselves.

Production



▲ **Foam Cutting for Fairing**

Propeller Assembly ▶

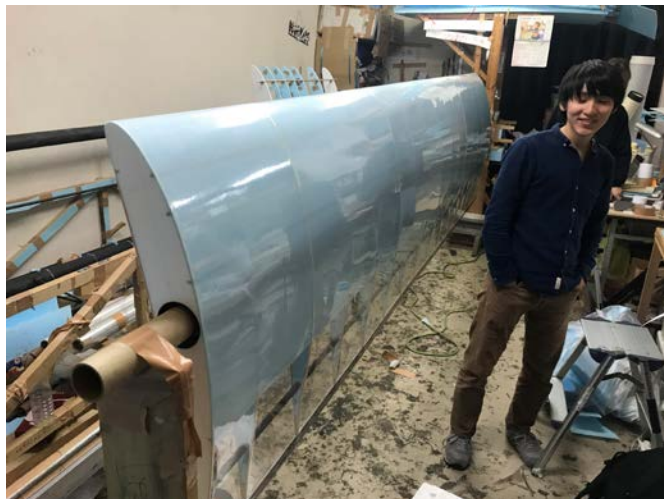


▲ **Avionics Programming**

Test

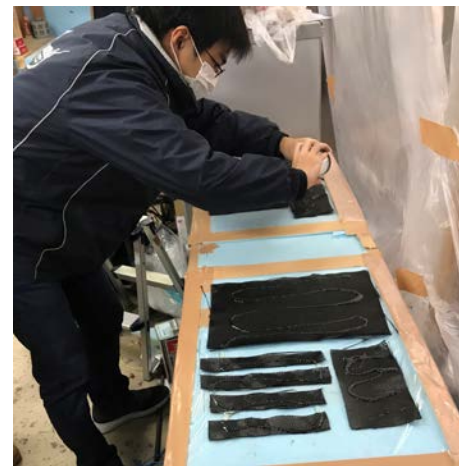


▼ **Frame Jointing**



Carbon Fiber Cloth Impregnation & Layup ▶

◀ **Wing Test Production**



Designing

Production

Test



Load Test (Feb. 2020)

Ensured airworthiness of wing structure

Wing Assembly Check
(Feb. 2020)

Seating Fit Check
(Mar. 2020)

Drive System Test
Steering System Test
Roll Out
Flight Test & Training
:To be done in spring 2021

Difficulties in responding to COVID-19 pandemic

We were building the airframe as planned, but at the end of March we were banned by the university from working on it, and furthermore the 2020 competition was cancelled. We are now back to build the airframe and hoping to participate in the 2021 competition, but our activity is still limited by the university. All members of the club have never handled airframe construction before joining the club. We learn how to build and fly an airplane through club activities similar to on-the-job training. Not having the opportunity to fly this year means the club will be disconnected from its activities. We are seriously troubled by this situation.