

MAX SPEED COMPARATIVE between DUC VARIABLE PITCH PROPELLER and E-PROPS GROUND ADJUSTABLE PROPELLER

In May 2015, the DUC HELICES company has made a test campaign with its propeller model : 2-blades variable pitch **FLASHBLACK** (diameter 170 cm, weight 5,9 kg), on a SHARK aircraft with a Rotax 912S engine (100 hp).

A TAS record (true speed) @ **300,51 km/h** has been registered.



SHARK 100 hp with a 2-blades DUC variable pitch FLASHBLACK

CLASS						
RAL2T	Speed over a straight course	300.51 km/h	2015-06-30	Eric De Barberin-Barberini (FRA)	ratified - current record	17582
FAI Record File Num #17582 [Direct Link]						
Status:	ratified - current record					
Region:	World					
Class:	R (Microlights and paramotors)					
Sub-Class:	RAL2T (Microlights : Movable Aerodynamic Control / Landplane / Flown with two persons / Thermal Engine)					
Category:	Not applicable					
Group:	Not applicable					
Type of record:	Speed over a straight course					
Performance:	300.51 km/h					
Date:	2015-06-30					
Course/Location:	Cuers (France)					
Claimant	Eric De Barberin-Barberini (FRA)					
Crew	Antoine Seidner (France);43682,					
Microlight:	Shark					

In April 2018, the SHARK AERO company has made max speed tests with a 3-blades propeller: **E-PROPS ground adjustable pitch DURANDAL 100-M** (diameter 170 cm, weight 2,6 kg), on their SHARK 100 cv aircraft.

The TAS has been measured between 310 and 320 km/h, i.e. **315 km/h**.



Shark.aero
16 avril, 18:35 · 16-04-2018

testflight airbox + main doors + E-prop. TAS and GS km/h. No turbulence, but strong wind - 60 km/h, difference upwind-downwing in groundspeed is 120+ km/h : 240-250 km/h / 370-380 km/h. OAT 18°C, DA 3800 ft, MAP 28,4, slightly overturning up to 5650 rpm. It looks on average 305-310 km/h GS, TAS is showing 5-10 km/h more. not bad. will proceed with front doors, tuned exhaust, EFI kit from Thomas Hauklien and finally working to calculate optimized prop. And some next systems to improve speed/economy planned to test.

Note - it is difficult to fly this speeds. need to have calm air. in normal summer turbulence is typical XC speed 250-270 km/h. Over this it start to be not comfortable. This modifications will improve economy at normal XC speed.



SHARK 100 hp with E-PROPS 3-blades ground adjustable pitch DURANDAL 100-M

A gap of 5% of the max speed in favour of the ground adjustable pitch propeller: impressive !

How such a gap is possible ?

The E-PROPS are **3rd generation of propeller**.

Due to mechanical performances of the carbon fiber, new aerodynamic designs become possible : high CL profiles, narrow chords, very big diameters, positions of the blades... The numerical modelling studies allow to optimize propeller's performances on all speed's range of the aircraft. It is possible to obtain the best thrust during all the flight with the same pitch (what is called "ESR effect" on E-PROPS propellers). It is not necessary to choose between "take-off" and "cruise" performances. The increases in efficiency are important.

The DURANDAL model has a strong **ESR effect**. The term ESR effect (Extended Speed Range effect) is used to define a fixed pitch propeller (or ground adjustable pitch one) which behaviour is comparable to the behaviour of a variable pitch propeller.

This ESR effect has the following characteristics : it causes very small gap between the static RPM and the flight RPM, and this allows to keep a strong power at take-off. It seems that the max throttle RPM stays nearly constant.

From technical point of view, there are different solutions to obtain this ESR effect :

- narrow chord with classic profiles
- pitch reduction at low speed by blades deformation (difficult to obtain)
- narrow chord with special profiles, in order to avoid the stall of the blades => it is the case of the DURANDAL models

<i>comparative</i>	DUC FLASHBLACK	E-PROPS DURANDAL 100-M
type of propeller	variable pitch	gournd adjustable pitch
number of blades	2	3
diameter	170 cm	170 cm
weight	5,9 kg	2,6 kg
take-off distance	identical	
TAS	300 km/h	315 km/h
public price without taxes	6 783 euros	1 460 euros

In choosing E-PROPS, the gains are :

- **15 km/h** in max speed
- **3,3 kg** (reduce the total weight and the weight on the Rotax 912S gear box)
- **5 323 euros** ht
- a **great ease** of use

This explains the very important success of the E-PROPS propellers...



Flying faster further safely with E-PROPS !