A new lightweight VP prop on the market

by John Archer

My Europa, kit number 192, like many other early models has undergone many upgrades over the years, 8,33 kHz radio, mode S transponder and an engine upgrade, the list goes on but as I don't want to think about the cost I will stop there!

I live in Grenoble, France which is nestled in French Alps where I do a lot of my flying. The need for optimum performance getting out of short high altitude strips especially when it's hot is hardly a luxury.

I had previously replaced the fixed pitch ground adjustable Warp Drive in January 2016 with an E-Props Durandal which was also ground adjustable but not in flight. I have been very happy flying behind this propeller as it is very light weight and therefore low inertia which we are told is good for our Rotax gearboxes and vibration free. It provided a significant gain in take-performance compared to the Warp Drive, about 15% as well as a small increase in cruise speed.

Then, about 3 years ago I started hearing rumours that E-Props were looking to produce an in-flight variable pitch propeller. I was curious, even interested, in spite of the, what seemed to be a eye-watering price! One year, two years pass, then in 2021 during a visit to their factory I saw a completely different and unusually shaped propeller on the company test aircraft. It was their new VP propeller the "Glorieuse", still not for sale but it was undergoing testing!

Fast forward to 2022, the decision to purchase behind me and yes, they would finally sell me one for my Europa! Obtaining the necessary paperwork, a temporary permit to fly took about two months and was relatively painless, in part due to fact I had gone through a similar procedure for the previous Durandal propeller.

Now I was up against the clock, the Fly-In in Useldange, Luxembourg was only 5 weeks away and I was keen to show off something new on a Europa! E-Props were already preparing my propeller, a date was set for the installation at their factory which is a convenient 30 minute flight away from my home airport, Le Versoud LFLG. A couple of emails and a phone call to my "friends" at the OSAC, the French equivalent of the UK CAA and they said "if you can get the flight test data in for Monday 23 May we can deliver the authorisation before the departure date on the 27 May". The clock was ticking, I also had a holiday and a family visit to fit in before then! The installation and test flight went without a hitch except that the original Rotax RPM gauge refused to work with the propeller controller (a known problem according to the Rotax Owner Forum). That was fixed by purchasing an Aviasport IM-1105 RPM gauge delivered the day before I left for Luxembourg. Just in time!

As those who attended the excellent Luxembourg trip know, not only did I get there I was there first. That was down to the weather however, where a large cold front blocking anyone coming from the North or the East which delayed their arrival.

Technical Characteristics and Description

The technical data is from the E-Props web site. https://aircraft.e-props.fr/glorieuse.php

E-PROPS "Constant Speed" specific instrument, designed and manufactured by E-PROPS adapted for GLORIEUSE in-flight variable pitch propellers range.

Rpm adjustment potentiometer, manifold pressure, tachometer, oil pressure, oil T°, water T°, battery voltage can all be displayed on the screen.
Diameter = 57 mm (2.24 inch)
Weight = 70 g
Automatic over-torque and over-rpm protection. Setting via Bluetooth High, readability screen.

E-Props CS Controller

The GLORIEUSE: 3-blade tractor propellers, full Carbon with Titanium leading edge protection, in-flight variable pitch system (Constant Speed) For ROTAX 912S / 912iS / 914 / 915iS engines. Max power: 140 hp, Max rpm: 2.600
Moment of inertia: 22OO kg. cm for the 160 cm diameter as fitted on my Europa
Total weight: 3-blade propeller + governor + CS instrument + spinner = 4 kg includes titanium screws.
Electro-hydraulic control for all Rotax 9xx configurations
Max pitch / min pitch in less than 5 seconds
Safety stops min. pitch / max. pitch
Pitch variation: max. range 16°
Easy to assemble. Unlimited potential, MTBO / Major inspection recommended at 2,000 hours (target)

The entire package has been designed to give optimum performance, high strength and durability with minimum weight which is the leitmotiv of E-Props. The engine's oil system provides the energy source to change propeller pitch via an electro-valve which is piloted from the propeller controller. The oil is then returned to the tank via a return line. The propeller blade's particular gull wing shape is not for show, it aerodynamically assists the blade rotation by reducing the forces required.

Flight Test and Observations

Flight test conditions: 13/05/2022 11-40 UTC at Le Versoud LFLG, Aircraft weight 478 kg, Wind -2 kts at 180 degrees tailwind, Temperature 25 °C, QNH 1020 hPa, Pressure Altitude 500'. All speeds are GPS derived ground speeds flown in a triangular 120 degree pattern.

Take off Performance

Brake release to Take ofF..... 9 s
Take-off roll 140m
Clearance 15m.....13 s and 245 m
V passing 15m..... 60 kts

Climb Performance

Initial climb Vx 61 kts, full flaps and gear extended
MAP.....max 28.5"
Engine RPM.....5500
Vz Indicated.....700 ft/min

Continuous Climb

Gear and flaps retracted cowl flap fully open, V = Vy 71 kts
MAP.....max 28.5"
Engine RPM..... 5500
Vz Indicated.....1100 ft/min

Cruise Speeds QNH 1013 3000' 21 °C 5200 RPM

MAP"	GPS Corrected GS Kts
22	113
23	118
24	126
25	133
WOT	141
22@4800 rpm	110

Cruise Speeds QNH 1013 5000' 15 °C 5200 RPM

MAP"	GPS Corrected GS Kts
22	117
23	122
24	133
25	134
WOT	136
22@4800 rpm	115

Additional flight data taken on the 28/07/2022

WOT QNH 1013 3000' 25 °C 5500 RPM 146 kts

WOT QNH 1013 5000' 20 °C 5500 RPM 144 kts

Conclusions

To summarise, I am very happy with the Glorieuse as it has enhanced the performance of my aircraft where I need it most for the type of flying I undertake. Take off and climb is markedly improved as you would expect as the engine can develop more power with the higher RPM that is available. Initial flights (10 hours) seem to indicate a reduction in fuel consumption of 1 litre/hour but this can at least in part be attributed to the fact that the original Rotax RPM gauge was under-reading by 160 RPM!

With a wider cord blade than the previous propeller, speed reduction in the pattern is much better, a plus with such a slippery aircraft as the Europa. Lastly the total weight of all the components at only 4 kg allowed me to fit the new propeller and remain well within the weight and balance envelope when changing from a ground adjustable propeller.

Propeller Control Hardware