

Scope of application: The ASCALON propeller line is designed for **direct-drive** piston engines — Lycoming, Continental, and derivatives. This notice does not apply to geared engines (such as Rotax), which incorporate a reduction gearbox that attenuates crankshaft torsional vibrations.

Your ASCALON propeller is engineered for your engine — not for a generic one. Because every installation is unique, E-Props performs a personalized vibration survey for you. This is a rare service in light aviation, and it is included with the delivery of your propeller.

Why does E-Props perform this analysis?

Two engines of the same model — same manufacturer, same displacement — do not produce identical vibrations. The harmonics generated by the crankshaft vary with the engine's service history, manufacturing tolerances, ignition timing, and exact configuration. These vibrations are transmitted directly to the propeller (direct-drive engines have no gearbox to attenuate them).

Every installation exhibits **resonance conditions**: specific RPM ranges where engine excitation frequencies align with the natural frequencies of the propeller. Within these ranges, alternating stresses in the blades and engine components increase sharply — with no perceptible indication to the pilot in the cockpit. This phenomenon has been the root cause of propeller and engine failures in light aviation that occurred without any prior warning.

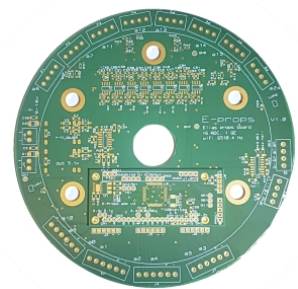
Vibration analysis maps these conditions for **your specific installation** and confirms that they fall well outside the RPM ranges you normally operate in.

The test must be conducted with **the actual propeller installed**, not with a substitute flywheel. The blades are an integral part of the vibration system: their mass and stiffness contribute to the natural frequencies of the assembly. With a simple flywheel, only the crankshaft's isolated signature would be measured — and it would be impossible to apply rated power without risking an overspeed. The actual vibration amplitudes that define in-flight behavior could not be characterized.

The ELIAS system

ELIAS is an onboard data acquisition system, designed and manufactured entirely by E-Props. It is integrated into a spacer that mounts between the engine flange and the propeller hub. Within a few minutes of static ground testing, ELIAS precisely measures the vibrations of the propulsion system, blade strain, and instantaneous engine RPM.

The customer version is a streamlined variant of the system E-Props uses for its own instrumented flight test campaigns on its test aircraft (Pena Bilouis Lycoming 180 hp and Jodel DR1054 Lycoming 150 hp). It is designed for straightforward operation, requiring no specialized technical expertise.



ELIAS electronics board

HELICES E-PROPS ADVANCED CARBON PROPELLERS

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Two-step procedure

① Static ground test with the ELIAS spacer

Your ASCALON propeller is delivered with an **ELIAS-equipped spacer**. You install this assembly on your engine following the enclosed procedure, then perform a static ground test: a progressive RPM sweep with a few stabilized power settings. ELIAS automatically records all data. At the end of the test, you send the data file by email to the E-Props engineering department.

Analysis is fast. E-Props provides you with the **vibration profile** of your installation: the exact location of resonance conditions as a function of engine RPM, and confirmation that your assembly is operating within optimal parameters.

② Delivery of your definitive spacer

If your installation is optimal — which is the most common outcome — E-Props ships your definitive spacer. You install it in place of the ELIAS spacer. Your propeller is ready.

If a resonance condition needs to be repositioned, E-Props ships a corrected definitive propeller directly to you, with no further testing required on your end — E-Props already holds the complete vibration signature of your installation.

Historical reference: Hartzell vibration campaigns

In the past, **Hartzell Propeller** conducted extensive propeller-engine vibration compatibility testing for the experimental and homebuilt aircraft community. This systematic work on **Lycoming** and **Continental** engines — now documented in Hartzell Technical Manual 193 — made it possible to identify and resolve numerous resonance phenomena that had caused unexplained failures. It led to the establishment of restricted RPM ranges, indicated by the yellow and red arcs on tachometers of many certificated aircraft.

E-Props applies this same engineering rigor to every individual installation today. The approach is not new — it has been proven for decades. It is simply extended, for the first time, to **your specific engine**, using modern and compact electronic instrumentation.

What you gain

You receive the **vibration profile** of your installation — data that very few light aircraft owners possess. Your ASCALON propeller is optimized for your engine. Reduced in-flight vibration means less pilot fatigue, extended service life for your engine, airframe, and instruments, and the assurance of operating a fully characterized propulsion system.

This procedure is implemented for the launch of the ASCALON product line, to build a database covering the most common engine types. In time, only unusual powerplant configurations or engines with limited fleet data will require this individual analysis.

