

## VIBRATIONS

E-Props propellers are known for generating very little vibration, because they are very light, and all balanced on a dynamic electronic bench. The E-Props team devotes a great deal of time to this operation, and balancing tolerances on both new and repaired propellers are extremely low.

However, pilots may occasionally experience vibrations during flight. These may originate from the propeller, the engine and/or the aircraft.

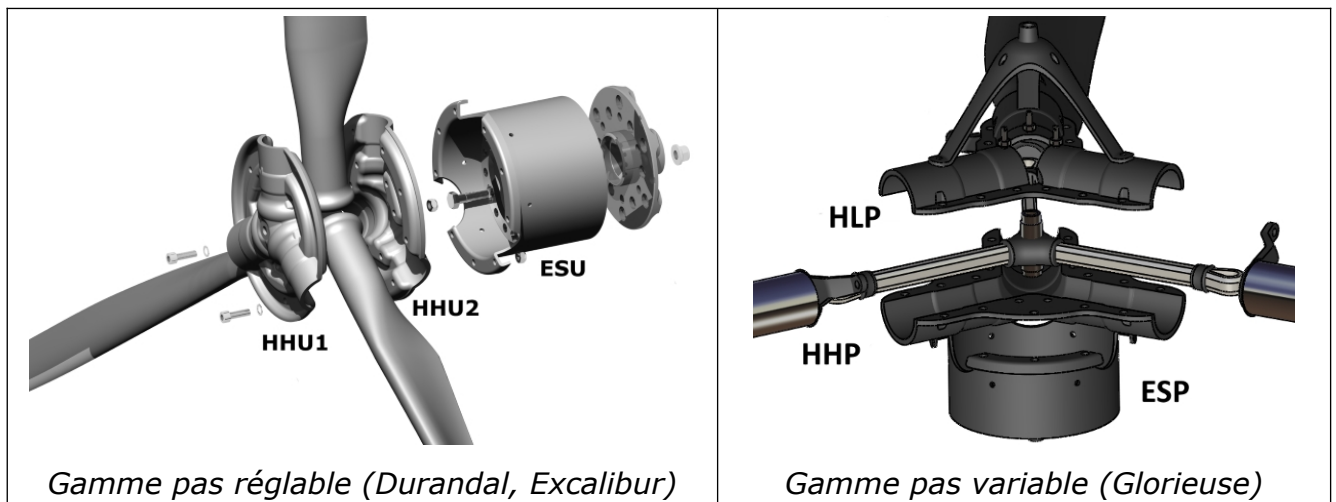
Here are a few tips to help you identify and resolve the problem.

### 1. Origin : propeller

First of all, you need to make sure that all the components in each propeller are the original ones. If they are mixed with parts from other propellers, the balancing would not be respected and vibrations could occur. This is easy to see, as each component has a unique serial number.

These numbers can be found on the Delivery Note, Invoice and Propeller Identification Sheet. And of course, if in doubt, ask the E-Props team.

Each propeller is carefully balanced with: blades, 2-part hub (HH 1&2, HLP & HHP), spacer (ES). The spinners and their plates are balanced separately.



Note: in a propeller, the blades don't necessarily have to have the same mass. If your blades don't have the same mass, it doesn't matter. What counts for perfect balancing is the distribution of mass along the length of the blade, i.e. the static moment.

The maximum E-PROPS tolerance for static moment is **0.4 g/m**.

More information on E-PROPS propeller balancing => [Eprops-balancing-EN.pdf](#)

On ground-adjustable pitch E-Props propellers (Durandal and Excalibur ranges), a significant difference in blade pitch can generate vibrations.

The maximum blade deviation tolerance on these models is **0.3°**.

The first thing to do in the event of vibrations occurring after the initial installation of a ground-adjustable pitch propeller is to measure the difference in blade pitch. The measuring method is explained in the Manual, on the website, on the Propeller Identification Sheet and in a video. The E-Props team is also available to explain the procedure.

In most cases, it's this gap that explains the vibrations felt with a new ground adjustable pitch E-Props propeller.

In the case of inflight variable-pitch E-Props propellers, any vibrations may be due to the position of the connecting arms, which must remain paired with the blades (thanks to the coloured stickers). Assembly must be carried out in accordance with the manual, the videos and all the instructions provided by the E-Props team.

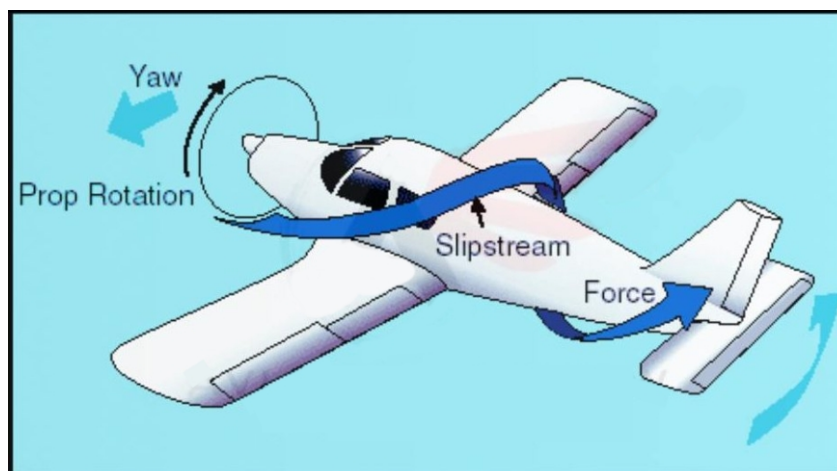
Next, check the tightness of the screws securing the propeller to the engine flange. When first fitted, the carbon may be slightly compressed, and if tightening is not evenly distributed, this may lead to vibrations. Always use a torque wrench.

The spinner and its plate are balanced together. They should be fitted with the correct pairing (with stickers).

If the spinner is painted after delivery by E-Props, check its balance after painting.

If the accessories (spinner, plate, spacer) are not supplied by E-Props, they may be badly balanced and therefore generate vibrations. In this case, you'll need to re-balance the whole unit.

Propellers produce a helical airflow that can interact with the airframe or other aircraft surfaces, creating vibrations. Changing propellers can change this flow and generate different vibrations.





## 2. Origin : engine

The vibrations you feel may also be coming from the engine. This phenomenon may not have been felt with another propeller. Fitting an ultra-light, well-balanced E-Props can reveal areas of engine vibration previously masked by the vibrations of the old propeller.

The main cause of vibration around 1800 - 2000 rpm is poor carburetor synchronization.

As soon as an engine has at least 2 carburetors, they must be synchronized in order to respect a balance of pressures and flows. The throttle valves must be positioned identically on their idle stops, so that they rise or turn together without any offset.

If the vibrations are felt at around 2500 rpm, it may be that the idling nozzle is not lean enough.

Check the air richness screw setting. This is the small brass screw also located on the left-hand side of the carburetor. This screw should be tightened all the way (but not too tightly), then loosened slightly, depending on the engine and configuration.

The gearbox can also generate vibrations. Excessive play between the gears can induce vibrations at certain engine speed ranges. Note that a heavy propeller with a high static moment quickly damages gearboxes.

Another cause of vibration may be the condition of the engine silent-blocks. Some may be too soft or too rigid, or in poor condition, in which case they should be replaced. Beware of the quality of silent-blocs: there are many counterfeit products on the market.

## 3. Origin : aircraft

Finally, it's possible that the vibrations you feel are coming from the aircraft. They can sometimes become more sensitive when equipment is changed.

If a vibratory frequency of the engine or propeller resonates with a natural frequency of the airframe (wings, tailplane), this can amplify vibrations.

Poorly adjusted or worn mechanical controls can transmit vibrations.

Engine cowling fasteners should also be checked.

Wheel rotation can generate unbalance and lead to vibrations. This can be more or less sensitive, depending on the propeller. For example, on MCR, which are very sensitive to this phenomenon, the front wheel must be braked to avoid vibrations, especially just after take-off.

## 4. Diagnostic

Before worrying about the appearance of vibrations after a propeller change, it's essential to establish a diagnosis. Here are a few tips to help you do just that:

### Flight phase:

- Determine whether vibrations appear at a particular engine speed (idle, take-off, climb, cruise, full throttle, descent).
- Identify whether they vary with speed or flight configuration.

### Localization:

- Observe whether vibrations are more noticeable in the seat, flight controls or via instruments (indication of their origin).

### Inspection:

- Check propeller: serial numbers of components, position of elements, pitch gap between blades, tightening.
- Examine engine mountings, brackets and cowlings.
- Check carburetor timing and idle nozzle.
- Check aircraft control surfaces and linkages for play.

Once an initial diagnostic has been made, if nothing obvious is apparent, you can use equipment to measure vibration frequencies and compare them with the characteristic frequencies of the engine and its components. Some maintenance workshops have with this type of equipment.

If you have the opportunity to fit another propeller, you can see whether the phenomenon recurs in the same way or not.

## 5. Conclusion

If you notice vibrations after the initial installation of an E-Props, ground-adjustable or variable-pitch models, it is essential to establish an initial diagnostic, which will guide our team's analysis.

Vibrations must be taken seriously, as they can affect comfort, aircraft structure and, in the long term, safety.