How It Works: PPK vs. GCP Drone Surveying

Post-processing and real-time kinematic workflows are more accessible as newer drones come to market. But there’s still a lot of confusion about what the technology is, how it works, and what’s best for your surveying needs.

To cut through the complexity, we’re explaining how PPK workflows differ from GCP-based drone surveying and how RTK plays into it all.

Ground control and traditional drone surveying

For traditional drone surveying, you need a sufficient number of known points to verify and pin your drone imagery to the ground. Standard drones without GPS correctional processing are simply a vehicle for the camera.

Its position in the sky is not accurately geotagged, so you don’t get reliable positional data from its hardware alone; that accuracy comes from ground control, which is why even small errors in ground control setup can have huge repercussions.
Ground control points (GCPs) can be known points marked and measured with base and rover or a moveable smart ground control points like Propeller’s AeroPoints.

Using GCPs when surveying ensures survey-grade accuracy, but setup can be time-consuming on a large site.

**Setting up ground control with AeroPoints**

If you’re working with smart GCPs like AeroPoints, you need to drop the hardware in an optimal distribution across the entire surveyed area. This method also takes time, but it saves on shooting points with a rover on foot and painting them for visibility.
Once AeroPoints are in place, the process becomes infinitely simpler. Activation requires only a single button, then they’re ready to start gathering information. When your drone survey is complete, you gather them back up and they automatically search for a WiFi signal to begin uploading their data to Propeller.

As recently as a few years ago, the planning, risk assessment, and legwork associated with setting up ground control has been a necessary, if unwanted, sacrifice.

**Onboard differential GPS has reduced the amount of ground control needed**

RTK-enabled drones have the ability to track their own positions accurately, which regular drones lack. A PPK workflow is our recommended method for topoing a site via drone for reasons we’ll go into further down. But first, let’s learn what makes these two technologies different.
How on-board RTK technology works

Real-time kinematic (RTK) processing on a drone records GPS information and geotags images as they’re captured during flight. The GPS location is recorded for the center of the image.

An active base station on the ground sends raw GPS data to the drone. Then the drone’s onboard GPS combines that info and its own observations to accurately determine its position relative to the base.

But to achieve this, the RTK drone must stay connected to the base station while it’s gathering data. Unfortunately, signal loss can occur during turns, likely due to antenna orientation, and other instances. If this happens, while it tries to get a lock again data becomes unreliable.

The difference between PPK and RTK

Now, you might be wondering where does PPK come in. This is where things get tricky because we’re not strictly comparing apples to apples. PPK isn’t hardware, but rather a different processing workflow using an RTK drone.

PPK stands for “post-processing kinematic.” The difference with PPK workflows is how we process base station data for correction and accuracy.
With PPK, the drone will geotag X,Y,Z coordinates to each image based on that on-board GPS unit. While this is happening, a base (be it a base station, an AeroPoint, or CORS network) is also recording positional information, but with much more accurate triangulation.

After the flight is over, those two sets of GPS data are matched up using the photo timestamp. Then the initial, less-than-accurate onboard GPS data is corrected, giving precise geotags for the imagery.

While “real-time” technologies are appropriate in some situations, post-processing flight data using a PPK workflow brings an additional layer of reliability to your surveys.

Propeller and DJI have teamed up to launch the easiest-to-use survey-grade PPK drone surveying solution. Learn more about Propeller PPK and download our ebook.

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