



The New Survey-Grade Work Tool: Propeller PPK and AeroPoints

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Seeing a drone flying over a worksite is becoming more common, but drone surveying has also gained a reputation for being overly complex, not accurate enough, and something only people with in-depth flight and surveying knowledge can actually benefit from.

In many cases, that hasn't been too far from the truth.

That's why DJI and Propeller have teamed up to create a drone surveying solution that's accessible to everyone and highly accurate—Propeller PPK.

DJI dominates the market with reliable, easy-to-use, and innovate drones, and

with Propeller's help, they've taken the complex process of drone surveying and streamlined it into three simple steps.

Place. Fly. View.

Using the gold standard of drone surveying accuracy, post-processed kinematic (PPK), along with a dead-simple workflow, Propeller's PPK solution delivers measurable savings in both time and money to your site, while providing highly accurate, verifiable survey data you and your team can understand and trust.



In this ebook, we'll cover what PPK is, how it works, and how a Propeller PPK solution can improve:

- Surveying on a site without any drone technology
- Measurement and management on a site using a drone and traditional ground control
- Drone surveying workflows on sites using AeroPoints

Before we can understand what this PPK tech can do for you, we need to understand PPK itself. So let's dive in.

What is PPK drone technology?

New RTK-enabled drones have the ability to track their own positions accurately in the air, which regular drones lack. A PPK workflow is our recommended method for toping a site via drone for reasons we'll go into further down. But first, let's uncover what makes these two technologies different.



The difference between PPK and RTK

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 photo center.

However, standard on-drone GPS units aren't very accurate. They have variations on average of 10–30 feet from the actual X, Y, Z location of a feature in the real world.

But with RTK, a passive base station on the ground sends raw GPS data to the drone. Then the drone's on-board GPS that info and its own observations to accurately determine its position relative to the base.

But to achieve this, the RTK drone has to keep a connection with the base station the entire time it's gathering data. Unfortunately, drones can lose signal connections when they're turning, likely due to antenna orientation. If this happens, it can take some time to get lock again. While the lock is lost, your data accuracy drops significantly.

That's where things get tricky because we're not strictly comparing apples to apples. In reality, PPK is not another kind of hardware, but rather different processing workflow using an RTK-enabled 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 the CORS network) is also recording positional data.

After the flight is completed, those two sets of GPS data are processed to produce a precise trajectory for the drone, thanks to the photo's timestamps which allow the photo center to be determined from the trajectory. Knowing the offset after the fact, lets us rewrite the initial, less-than-accurate on-board GPS data, giving precise geotags for your drone imagery.

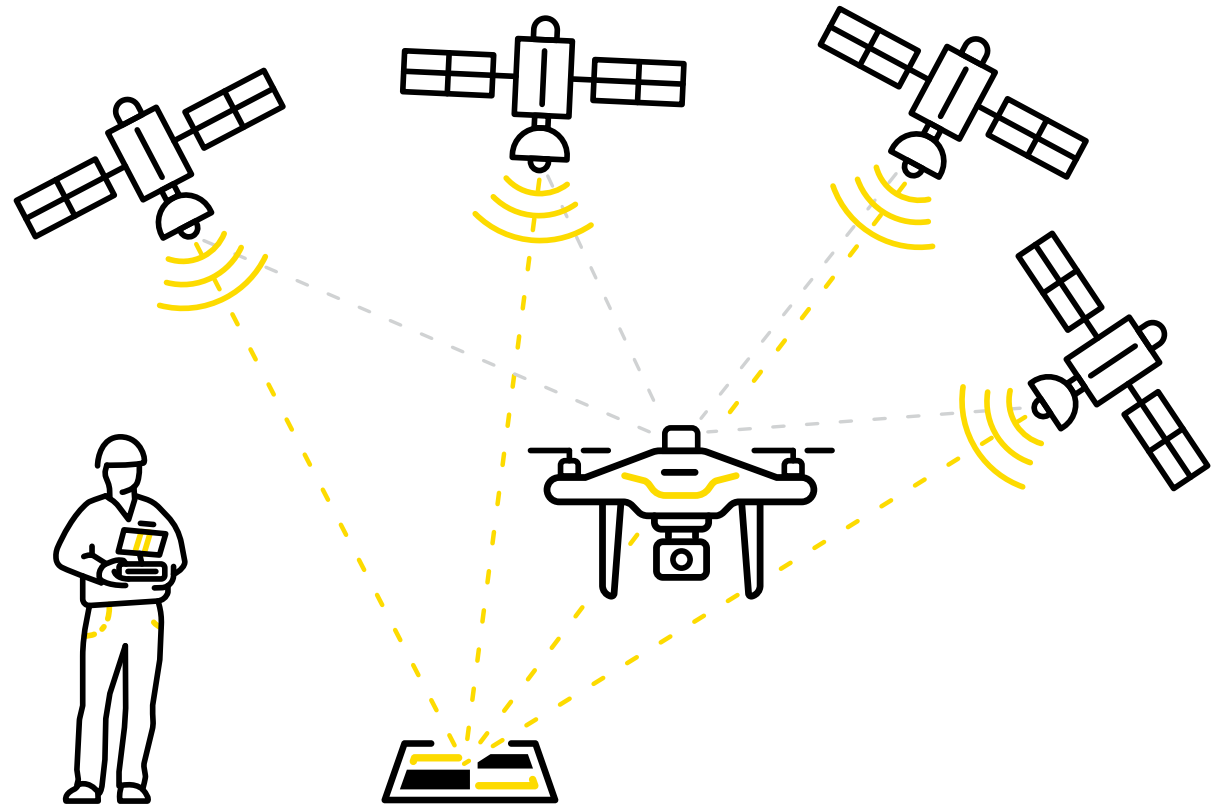
See how they stack up side by side:

RTK

- Requires stable radio link to receive base station data, which is processed during flight.
- Correction data and initialization loss results can reduce percentage of accurate camera positions, which is necessary for site survey rendering.

PPK

- No data or initialization loss by signal link limitations, as with RTK technology.
- All captured data processed with similar algorithms to RTK, run back and forth through the data.
- Overall, ensures the most reliable results possible.



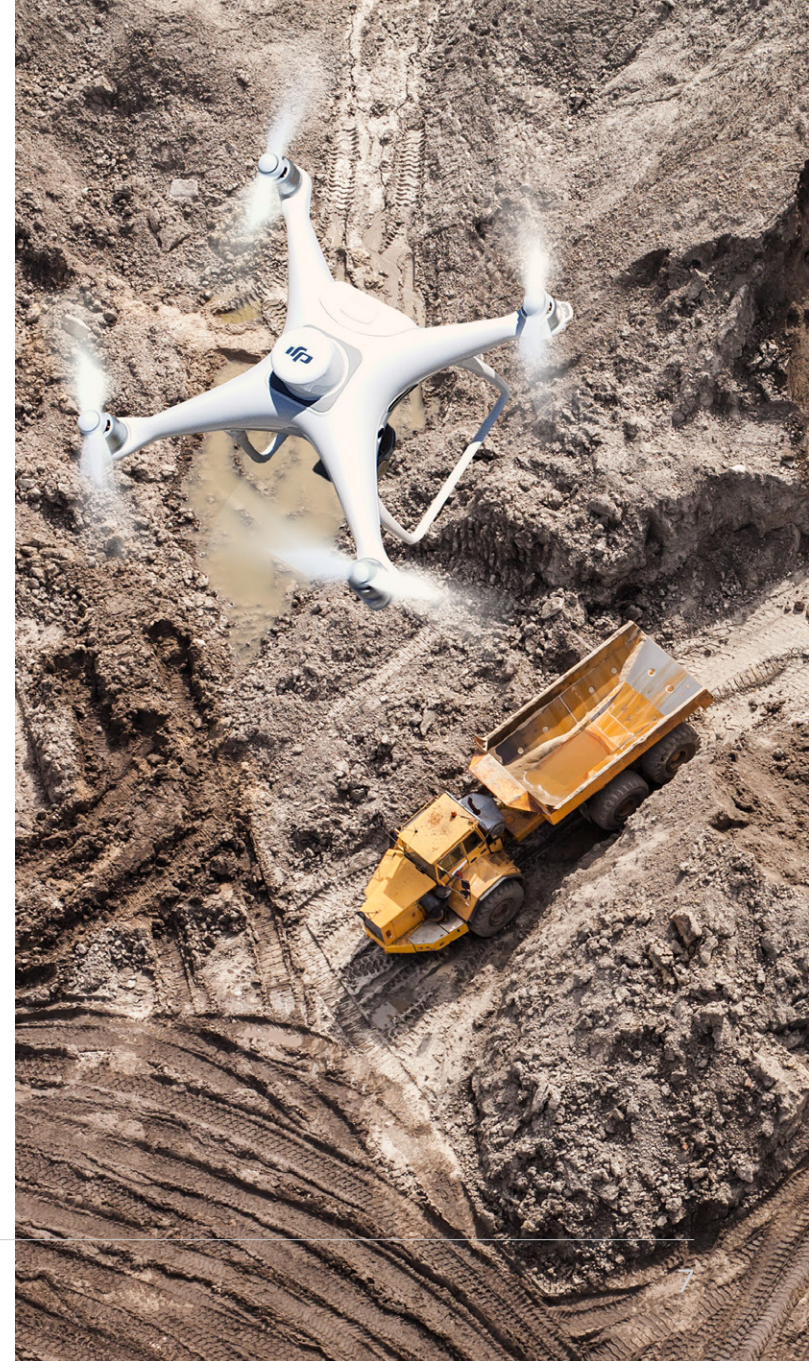
Propeller recommends PPK over RTK solutions

Because the RTK drone needs to maintain a connection to the base station the whole time it is taking data, signal loss can have repercussions on the accuracy of your dataset in some situations. Unfortunately, signal loss is difficult to predict and depends on the site, obstructions, and GPS-related disruptions.

Due to this possibility of inconstancy, we recommend PPK workflows over their RTK counterparts. So what does a PPK workflow look like in the real world?

Since everyone is coming to this technology from different places, we thought it'd be more helpful to outline how a PPK workflow can change operations when:

1. **You haven't done surveying with a drone at all on your site;**
2. **You're using a GCP-based drone surveying workflow; or**
3. **You're using AeroPoints in a traditional drone surveying workflow.**



1. How Propeller PPK revolutionizes surveying if you haven't used drones before

If you're working without the aid of drones to do your surveying, Propeller PPK can have a huge impact on your existing workflows.

Drone surveying, in general, reduces your end-to-end surveying time to hours instead of days or weeks. This means you can easily survey more often, thus getting the data you need about your site as often as you want to fly.

Drones don't require advanced personnel training or education, so you can capture the data yourself. Instead of sending out personnel to trek over your site with base and rover, you can take one ground control point and your drone and fly your site in a few minutes to a few hours, depending on the site's size.



The operational workflow couldn't get any simpler.



First, you plan out your drone's flight on the flight planning app.



Second, you find a safe, open area on your site to launch the drone from.



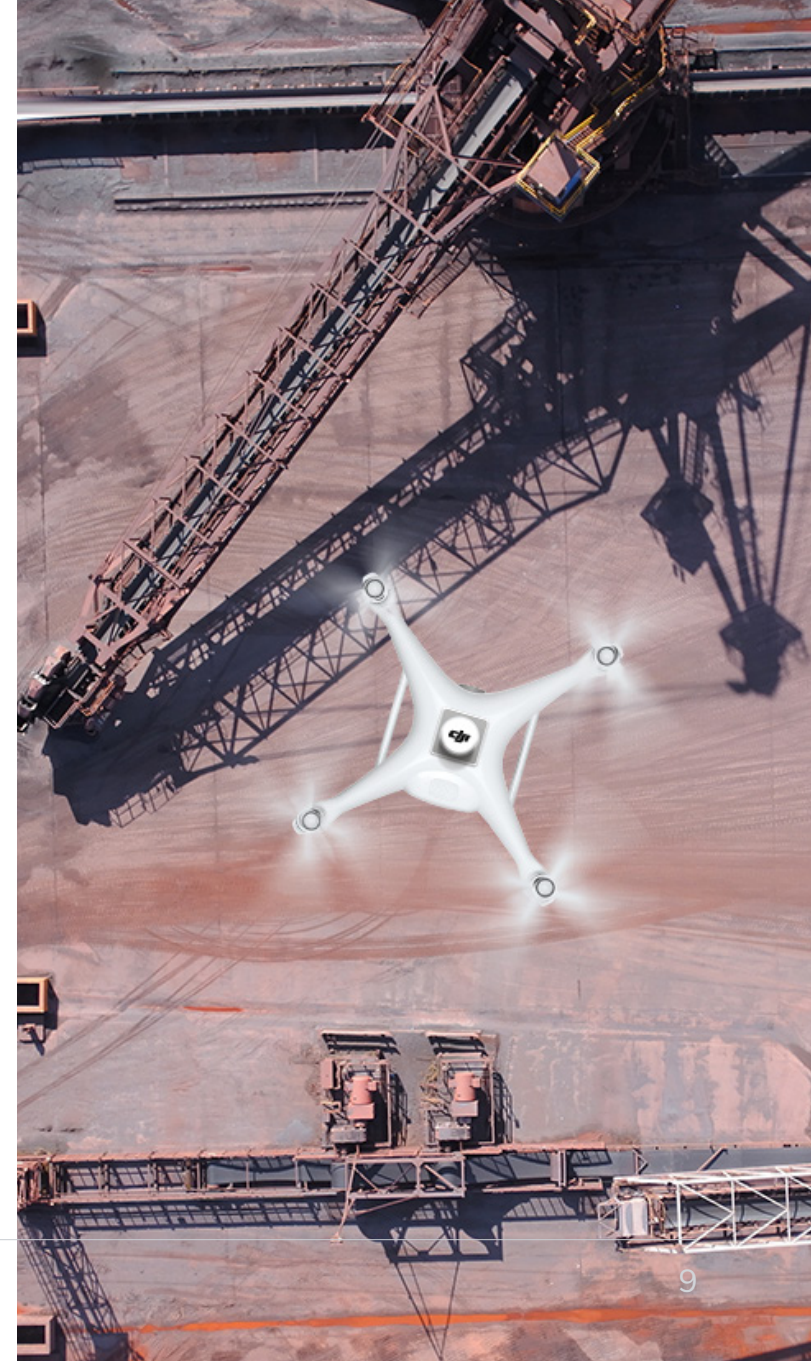
Third, you set up an AeroPoint on the ground nearby you and turn it on.



Fourth, you hit Go on your drone flight.

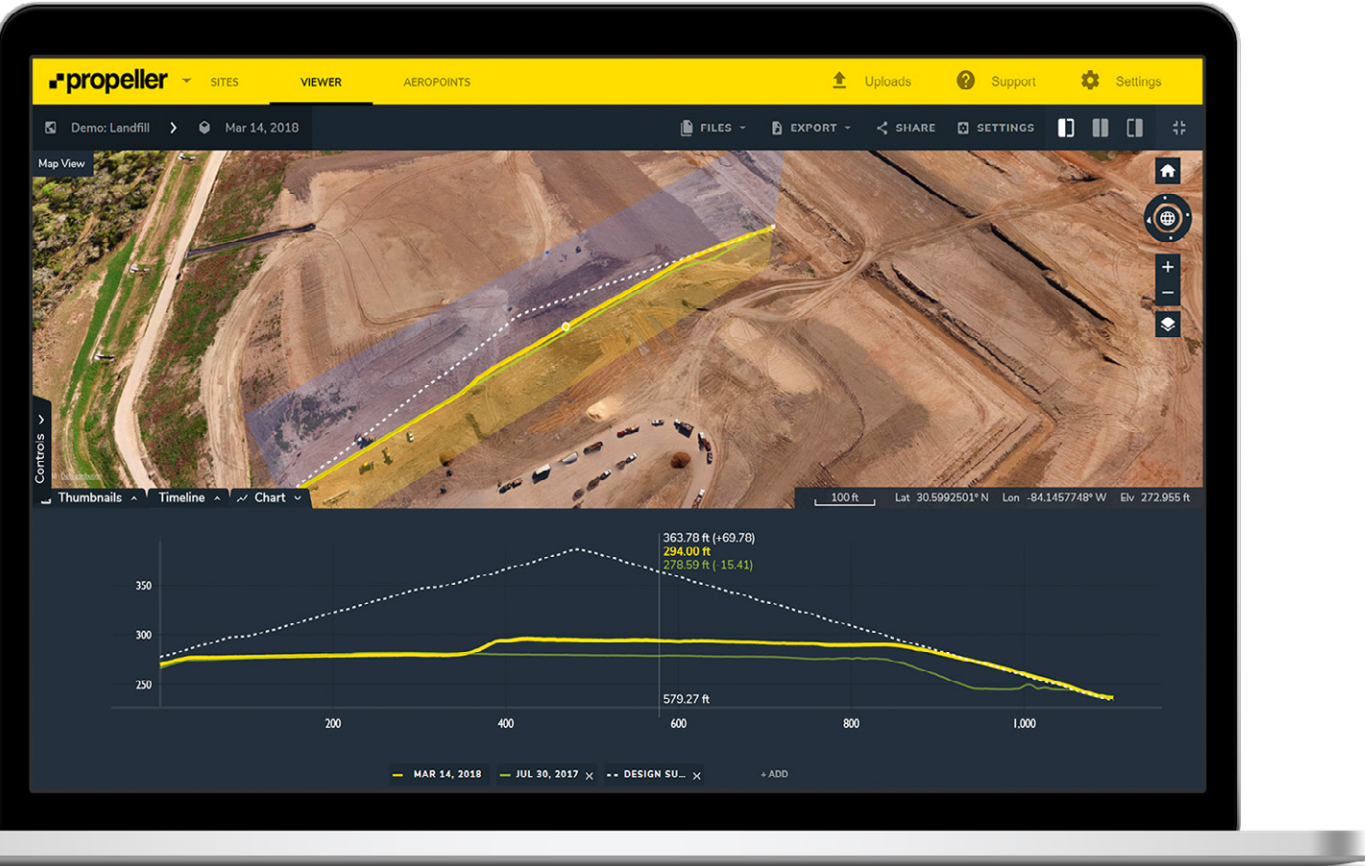
Once the drone finishes its flight and automatically returns to your location, upload your data to Propeller and let us do the processing for you.

No need to download any software. No need to tweak or preprocess imagery or site data. In 24 hours, your 3D site survey is rendered with survey-grade accuracy and you can start measuring and managing your site and your assets immediately.



2. How Propeller PPK improves GCP-based drone surveying workflows

Say goodbye to all that empty setup time. Being familiar with drone surveying, you know that it cuts days off typical surveying workflows because data gathering and processing is much faster. Drones are easy to operate and drone data processing platforms like Propeller are cloud-based, which means no more downloading complex, hardware- and labor-intensive software to do the processing.



With a PPK solution, your drone becomes more than just a vessel for the camera, it can take and record precise positional data from the air. This drastically cuts the need for ground control. In fact, all you need is one known point or a base station on the ground, which you can keep nearby.

The process of surveying your site by drone with Propeller's PPK workflow cuts down on the time-consuming process of ground control planning and placement. It also takes warping out of your 3D surveys, which can happen when ground control isn't properly distributed or isn't in place at all and severely affect survey accuracy.

For the smallest and most simple sites, you still have to strategize placement to ensure viable data gathering. Once that's done, physically traversing your site on foot or by vehicle and laying out all the GCPs (usually no less than 10) adds risk and complexity. You have to worry about traffic management, sending personnel on to an active site, and proper ground control layout.

For large or irregular sites, the same strategizing takes place, but the physical processing of laying out points can be longer than ever. Walking or driving the site could take hours, all before you've even fired up your drone.

With a PPK workflow, all that above complication is unnecessary. An RTK-enabled drone has the hardware to determine its position in flight, thus providing vital geotagged data for site imagery. And with just one data validation point on solid ground to cross validate your data in a PPK workflow, you can achieve survey-grade accuracy without all the setup.

It's as simple as setting up a base station or a GCP near your takeoff location. (If you're working in a local grid, that GCP needs to be on a known point.) You still need to map out your drone's flight route, of course, but there's no need to hike all over site to lay out ground control.

After the flight's been flown, the process is the simple data upload you're used to with drone surveying technology: upload the imagery and ground data to Propeller. We do all the processing and correction and you get an accurate, 3D site survey within 24 hours.



3. How Propeller PPK streamlines drone surveying when you're using AeroPoints

If you're an old pro when it comes to drone surveying, a PPK workflow is probably what you always wished traditional drone surveying was like. And if you're using AeroPoints in your current operations, you know that they can serve as an easy way to set up ground control on your site.

PPK workflows have numerous benefits, both in-field and in the data. When it comes to the final result, your survey itself, PPK takes warping out of your 3D surveys, which can happen when ground control isn't properly distributed or isn't in place at all.



But a PPK workflow can also drastically cut down on your drone surveying setup time. All that's required for proper data capture and processing on the ground is a single AeroPoint. These robust, moveable points also function as a passive base in a PPK workflow, eliminating the need to buy an expensive base station to get your data. Using more than one AeroPoint can serve as data validation.

This eliminates the need for planning, placing, and picking up GCPs. No more time spent mapping out your route beforehand. No more navigating an active or dangerous site

to place them out before flying. You only need one set up on a known point, and you're ready to fly.

Instead, you can plan out your drone's flight path on an app as usual and set up your craft in a safe takeoff location. Then simply set up a single AeroPoint in an open space nearby, turn it on, and fly your mission. Should you be working in local grid, just make sure that AeroPoint is placed on a known point.



Propeller PPK is the survey-grade solution

No matter where you're starting in your drone operations, Propeller PPK can improve your surveying workflows because when it comes down to it, all you want is confidence in your end survey.

Propeller PPK gives you that confidence with data you can trust and a workflow that closes the drone surveying loop and eliminates points of failure associated with inconsistent ground control layout.

Add in the reliability of industry-favorite drone, DJI's Phantom series, and the full integration of Propeller's hardware and software, and you get an easy-to-use survey-grade workflow without the hassle and complications of traditional surveying workflows.



Learn more about Propeller PPK or contact us to start the conversation about PPK on your worksite today.

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