



Safety

Inspecting a High-Risk Worksite? Drones Can Go Safely Where You Can't

Kip Hanson | Aug 03, 2023

Robots have taken over many of the dull, dirty and dangerous tasks in manufacturing. Machine guards keep operators' hands and fingers out of harm's way, and lockout/tagout procedures help maintenance workers avoid dangerous electrical shocks.

All told, manufacturing facilities today are safer than ever before. But there's one place where danger remains ... well, a danger, and that's up high.

All manufacturing facilities have a roof, and most are quite far above the ground. Still, it's essential to inspect them for leaks and other damage periodically and to make repairs. The same is true for HVAC systems mounted aloft, solar panels, skylights, satellite dishes and 5G antennae.

Working at such elevated heights, one misstep is all it takes to turn a routine inspection or maintenance job into a tragedy. Equally significant hazards exist with high-tension lines, chemical storage tanks, hydroelectric dams and even nuclear power plants.

Electronic Buddy System

The good news is that there's a faster, more effective and, above all, safer way to inspect these hard-to-reach, sometimes dangerous areas: drones

You might know them as quadcopters, miniature pilotless aircraft or unmanned aerial vehicles (UAVs), but whatever you call them, these flying robots have enjoyed an enormous surge in popularity over recent years, and not just for hobbyists.

For example, the Department of Energy's Oak Ridge National Laboratory (ORNL) uses drones carrying hyperspectral sensors, LiDAR (light detection and ranging) equipment and global positioning system (GPS) receivers to *map streams and monitor their mercury* levels.

Construction Technology magazine reports that drones survey terrain "*up to five times faster*" than traditional boots-on-the-ground methods. Another of their uses is in building inspection.

Among the innovators in this market is Swedish startup *FieldRobotix*, which claims (and rightly so) to “reach the unreachable.”

Another startup is *Dronomy*, a Spanish firm that delivers turn-key solutions for everything from precision agriculture to industrial inspection of “complex, dirty or dangerous environments.”

Technological advances allow drones to take volumetric measurements, map complex terrain and structures, detect heat sources and gas leaks and much more, all without putting humans at risk.

As noted, many of these drones come with advanced technology. There’s the LiDAR and GPS discussed a moment ago, not to mention infrared, chemical, and radiation sensors to detect what’s below and around them as well as gyroscopes, accelerometers and altimeters to keep drones oriented and aware of their positions in space.

As a result, they can take volumetric measurements, map complex terrain and structures, detect heat sources and gas leaks and much more, all without putting humans at risk.

Stormy Weather and Other Drone-Stopppers

Because autonomous drones have become so capable, there’s far less need for workers to climb ladders, descend into tunnels or maneuver telescoping booms high into the air (at least, not without sending a drone in first to scope things out).

Instead, the pilot can either drive a drone via joystick or send one on an autonomous flight plan into the danger zone, whichever is most effective at inspecting the target area, recording and analyzing the results.

Some even come with virtual reality (VR) headsets for an immersive flying experience.

By now, you’re probably intrigued, but there are some things you should know before adopting the technology:

- **Not Waterproof:** The first is that drones aren’t like ducks, or even humans with raincoats, for that matter. Most are far from waterproof, and inclement weather such as rain, snow, dust storms, extreme cold or desert temperatures can either interfere with the drone’s electronics or damage its propellers, sending it crashing to the ground below.
- **Lightning Strikes:** The same goes for lightning, which can quickly fry a drone’s silicon brains. High winds are similarly problematic, draining batteries and sending drones off course. A professional-grade drone can handle winds up to about 30 mph, but a good general rule is to avoid wind speeds greater than two-thirds of the drone’s maximum speed.
- **Battery Charges:** Battery life is similarly important. Many drones use lithium polymer (LiPo) batteries because they are lightweight and provide high energy capacity and discharge rates. They also charge faster than the alternative—and heavier—lithium-ion (Li-ion) batteries. However, LiPo batteries require careful management, including proper charging and storage, and shouldn’t be allowed to discharge fully (which is true for most batteries).
- **Training:** As with most industrial technologies, proper training is critical, and drone operation is no exception. Casual users looking to take a peek at their building façade can probably manage just fine with a thorough review of the owner’s manual, some YouTube instruction (there’s plenty of it available), and a little practice in a nearby field, but those wishing to make a business out of drone piloting would do well to check out the *Federal Aviation Administration guidelines* on the topic.

While quadcopters, also known as multirotor drones, are popular options, fixed-wing drones (which resemble traditional airplanes) are also available. These generally exhibit greater range and speed, so are better suited for large surveying jobs, while multirotor drones are more versatile and can fit into tighter areas.

Choosing the Best Drone for the Job

What about payload? Many drones carry nothing more than themselves and a camera and loading them up with the advanced sensing equipment discussed previously can quickly drain the batteries.

So consider what's essential before choosing the drones themselves as well as any onboard tools. That advice includes camera selection: How many pixels can you afford? Do you need a zoom lens? How about infrared capabilities for smoky conditions and nighttime use?

And returning to the question of battery life, how long does your drone need to stay airborne? Do you want features like automatic landing on low battery, return to home on loss of signal, collision avoidance and geofencing to keep your drone from entering prohibited airspace?

Lastly, check with the regulators in your area. Some have guidelines on maximum altitude and prohibited airspace, and others might insist on pilot certification, FAA or otherwise.

As for the U.S. Occupational Safety and Health Administration, it hasn't yet weighed in on industrial drone use specifically.

It does, however, require employers to provide safe, healthy workplaces—which would cover the hazards of falling drones and unprotected rotors.

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