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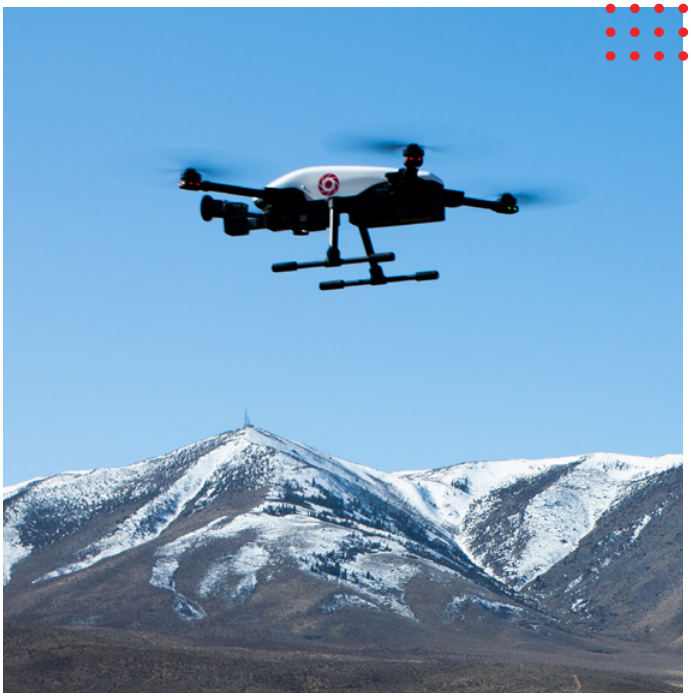
Industry Brief

THE SKY IS OPEN FOR BUSINESS

The Value Proposition for Drone Inspections

By: **Dawn M.K. Zoldi**

According to The Drone Market Report 2020–2025, inspection leads the long list of drone use cases. Unlike drone deliveries, which have not fully taken off and are largely customer-optional, many inspections are required by law. For that reason alone, the inspection value proposition will endure. The return on investment of drone inspections is also clear. Drone inspections have proven efficient, effective and economical. As technology advances, including critical detect-and-avoid (DAA) systems, the value of inspection-by-drone will only continue to exponentially increase into the future.



EVOLUTION OF THE INDUSTRY

Aerial inspections are not new. Improvements in helicopter technology in the 1950's opened up commercial opportunities for applications in oil, agriculture, utility, pipeline and power, construction and forestry. Then along came drones.

The Federal Aviation Administration issued its first commercial drone permit in 2006. However, it was not until Congress passed the FAA Modernization and Reform Act of 2012 (FMRA) that the commercial drone industry began to take off. The FMRA's §333 gave the FAA the authority to exempt certain drones from airworthiness certificate requirements and became the means to obtain formal approvals for drone operations in the national airspace (NAS). By mid-2015, the FAA had granted more than one thousand §333 approvals across a variety of use cases, including drone inspections.

In 2016, the FAA's final small drone rule, *Operation and Certification of Small Unmanned Aircraft Systems* (Part 107), took commercial drone operations to the next level. It authorized civil drones weighing between 0.55 and 55 pounds to routinely operate in the NAS up to 400 feet above ground level (AGL). Relevant to inspections, Part 107 contains a key but waivable operational limitation in §107.31 that requires remote pilots (RP) to maintain visual line-of-sight (VLOS) of the drone. More on this later.

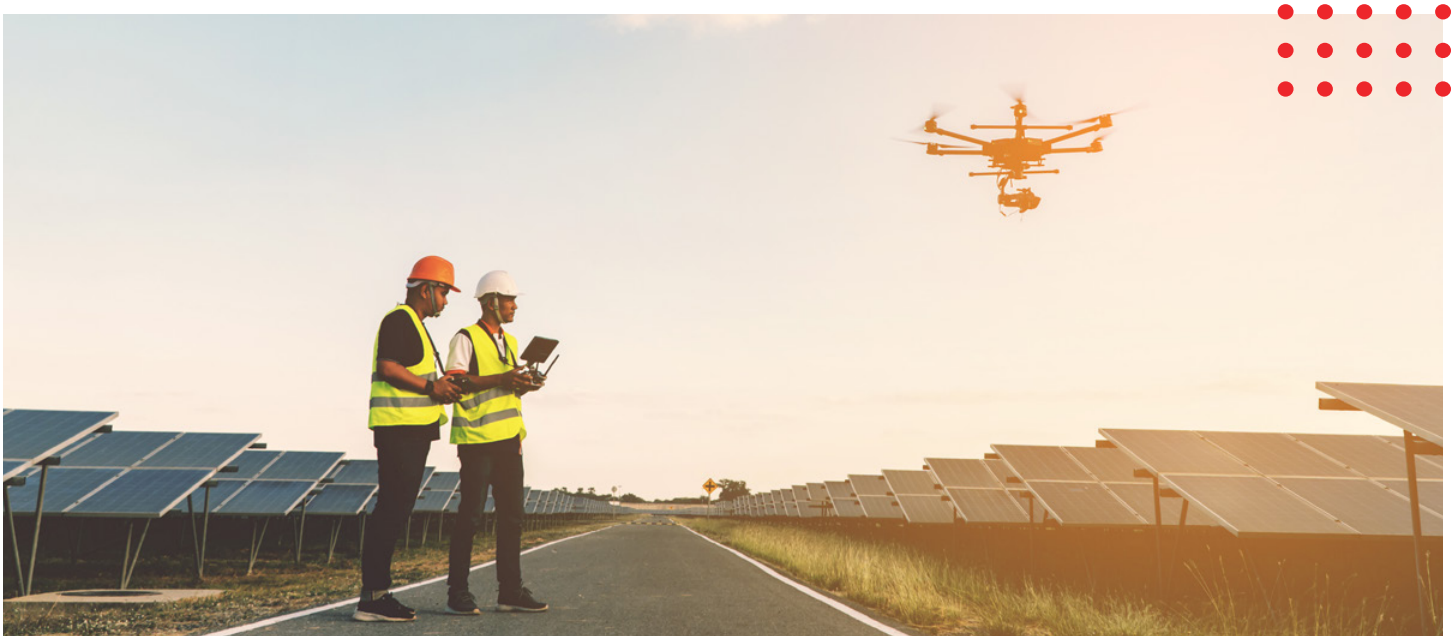
In the past few years, the commercial drone industry has launched in a big way. To date, the FAA has also certified 217,672 RPs, an increase of more than 200,000 RPs in a little more than a year. Less than two years in, this number of RPs already exceeds the FAA's five-year forecast from 2019. Over 865,000 RPs registered with the FAA as of March 15, 2020.. Of those, 372,281 fall in the commercial category. As the number of drones and RPs continues to climb, so does the breadth of applications for drone inspections. Agriculture, chemical industries, construction, infrastructure and utilities, insurance, mining, oil and gas companies now routinely use drones in their inspection processes.

ENDURING REQUIREMENTS

For many of these industries, inspections are not optional. The law requires them at all levels. Federal law regulates the dangerous mining industry, approximately 294,000 U.S. miners working across 12,500 metal, nonmetal and coal mines. To ensure compliance with mining health and safety standards, the U.S. Department of Labor's Mine Health and Safety Administration (MSHA) must inspect every underground mine four times a year and surface mines twice a year, in addition to out-of-cycle hazardous conditions complaint inspections. Some companies have created drone inspection business models for mines that provide an alternative to manual inspections that enhance safety and decrease the potential for human error.

States also levy their own requirements. Pennsylvania, Missouri and others have promulgated government-mandated power line vegetation ingress inspection requirements to mitigate encroachment. Historically, time-consuming, tedious and expensive manual inspections involved ground teams that climbed poles, often augmented by helicopters. According to *Power* magazine, today drones "enhance the range and productivity of (power line) inspection crews by orders of magnitude, boosting both coverage, volume, and quality of data capture."

National-level non-governmental organizations provide voluntary inspection guidance that nevertheless compels compliance. For example, American National Standards Institute (ANSI)-accredited Telecommunications Industry Association (TIA) issues guidelines for telecommunications towers. ANSI/TIA-222, the *Structural Standard for Antenna Supporting Structures and Antennas*, suggests inspections occur at three-year intervals for guyed masts, five-year intervals for self-supporting structures and more frequently for high-risk towers along the coast or in corrosive environments. Although this and similar standards remain voluntary, because they represent a consensus of the industry, they amount to an expected standard of care. Falling short of these standards could trigger liability in the event of a mishap, which should motivate companies to inspect.



EFFICIENCIES GAINED

Given the compelling need for inspections, doing so efficiently affects companies' bottom line. This can be measured in terms of decreased risk, enhanced safety and downtime saved. According to Jake Lahmann, Quality and UAS Manager at Valmont Industries, a global leader of engineered products and services for infrastructure, "The benefits of using drones for inspections are patently obvious in terms of risk and safety. Removing the need for manual high-altitude operations and heavy ground vehicles simply reduces the chances of potentially serious accidents." For utilities, Lahman explains, drones decrease landowner disruptions as well. "In my experience, a landowner would rather have a small drone flying over their property for a short duration than have a 90-ton crane driving across it."

Drones also reduce downtime for companies and the public. Recent bridge inspections in North Carolina illustrate this. In 2020, the FAA permitted its Department of Transportation (NCDOT) to conduct the first ever, state-wide approval bridge inspections. In a statement issued in February 2021, it stated, "NCDOT will use drones to conduct bridge inspections faster, saving money and reducing the need for lane closures." An American Association of State Highway and Transportation Official (AASHTO) survey supports this. The report includes a vignette from the Michigan DOT, which estimated a savings of $14,600 in user delay costs for shutting down just one of four lanes on a two-way metro highway bridge for the average 10-hour period it normally takes to complete a bridge inspection. Add time savings of laborers to this drone efficiencies list. The AASHTO report estimates that a manual bridge deck inspection would take two people eight hours to complete, compared to a drone inspection, which would take those same two people only one hour.

ECONOMICALLY SOUND

And time is money. To the extent that time savings accrue, so do monetary savings. For bridges, AASHTO estimates a manual operation costs $4,600 whereas a drone inspection costs $1200.

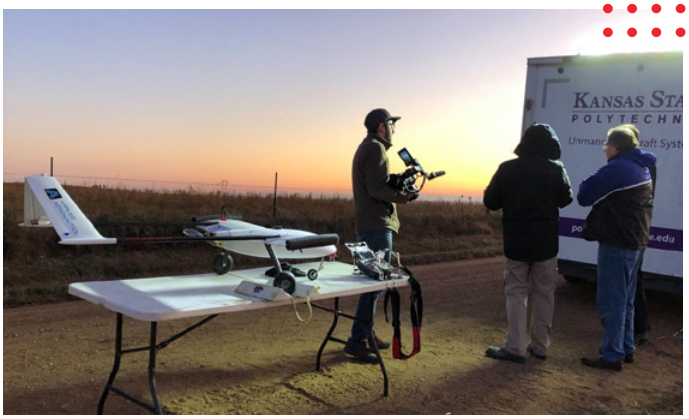
DRONE INSPECTION COST SAVINGS

BRIDGES 6% LESS THAN MANUAL

ELECTRICITY TRANSMISSION 10% LESS THAN HELICOPTER

Last year, *Energy Central* posted a head-to-head comparison of the cost of purchasing a drone versus a helicopter in utility inspections. According to their calculations, for companies with in-house inspection capabilities, an average inspection helicopter costs approximately $2M dollars for the aircraft itself. Other costs such as crew time and training, maintenance, insurance, and data analytics add up to a daily rate ranging from $9,000 to $30,000. The costs for the average drone suitable for transmission inspections amount to approximately a tenth of those costs.

Drones also alleviate the need to build expensive scaffolding for inspections and related maintenance. One drone guide estimates that companies can reduce these expenses up to 80–90%, to the tune of tens of thousands to hundreds of thousands in cost savings. The dollars make sense. Besides being comparatively inexpensive to buy, maintain and use, the quality of the data drones produce remains unparalleled.



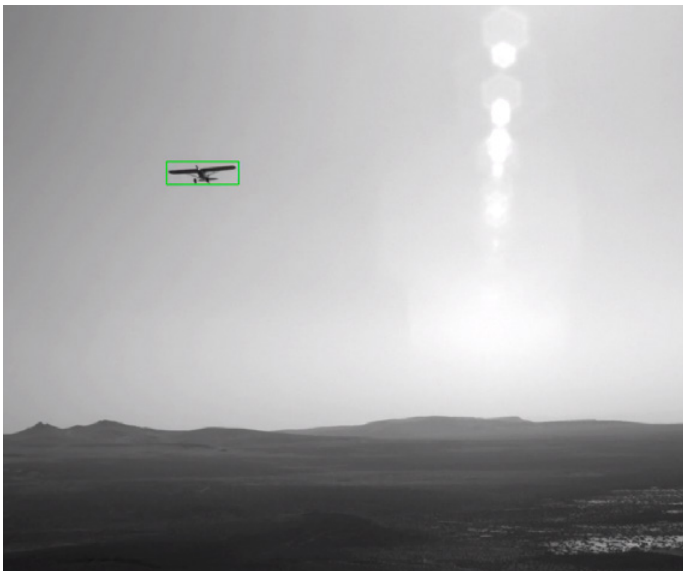
EFFECTIVENESS PROVEN

Drones can be equipped with technology that enhances data collection and processing, such as thermal (measuring object surface temperatures), multispectral (collecting spectrum wavelengths), hyperspectral (highly accurate wavelength bands) and LiDAR (Light, Detection and Ranging lasers measuring distances). Because they are small, they can fit in difficult-to-reach and obscured areas that helicopters and humans cannot. Drone flights also provide one continuous data stream instead of having to piece together point-to-point imagery from ground cameras. For enterprise leaders, all of this adds up to a level of quality of data previously unattainable.

EVEN BRIGHTER FUTURE

The future is even brighter for drone inspections once beyond VLOS (BVLOS) flights become more routine. BVLOS will enable long-line linear inspections as well as repeatable and scalable inspection operations.

Currently, BVLOS flight requires an FAA waiver to Part 107. Advanced technologies, such as DAA, bolster these waiver applications. The FAA has provided several companies in the infrastructure business with drone BVLOS waivers for inspections in the R&D context, including Florida Power and Light and Xcel Energy. The successful Northern Plains UAS Test Site (NPUASTS), part of the FAA's R&D effort, uses drones to inspect critical infrastructure such as wind turbines. NPUASTS also has invested $28 million in Vantis, a drone BVLOS network in North Dakota built around DAA and related command and control systems.



One DAA system that outpaces the rest: Iris Automation's Casia® X system. It enables real-time aircraft detection, alerting and collision avoidance. Iris Automation has pioneered the use of computer vision technology for DAA, and also provides regulatory professional services to assist customers seeking permissions for BVLOS and extended visual line of sight inspections by drone. Drone service provider Aerial Production Services teamed with Iris Automation's Regulatory Resource Center to achieve a BVLOS waiver for pipeline right-of-way inspection in North Dakota. R&D teams in both Kansas and in Canada are currently employing Iris' DAA system in their BVLOS test and evaluation efforts. Iris' Kansas effort is part of the FAA's larger research and development ecosystem, including the BEYOND program, which includes BVLOS as one of its primary goals. Its Canadian partnerships are likewise part of that country's equivalent R&D efforts.

For companies that need inspections as a critical part of their portfolio, the sky is open for business!

SOURCES:

1. https://www.dronethusiast.com/history-of-drones/
2. https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2020-40_FAA_Aerospace_Forecast.pdf
3. https://www.faa.gov/uas/resources/by_the_numbers/
4. https://www.msha.gov/compliance-enforcement/mine-inspections
5. https://www.powermag.com/the-past-present-and-future-of-powerline-inspection-automation/
6. https://tirap.org/wp-content/uploads/2017/06/PAN_ANSI-TIA-222_May-Jun_2017.pdf
7. https://www.ncdot.gov/news/press-releases/Pages/2021/2021-02-25-basnight-bridge-drone.aspx
8. http://asphaltmagazine.com/wp-content/uploads/2016/05/Dronesss.pdf
9. https://energycentral.com/c/pip/drone-vs-helicopters
10. https://www.flyability.com/drone-inspections
11. https://insideunmannedsystems.com/test-evaluation-programs