Drones: Driving a new standard of operational efficiency

Top Drone Use Cases and Benefits from Early Adopter Industries

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Drones are revolutionizing operations.

Humanity loves progress - a good, revolutionary technology. If it's faster, easier, cheaper, and better, it's as good as adopted. For the next several years, a great deal of progress will be whizzing around in the airspace above us. That's because **drones**, or **Unmanned Aerial Vehicles (UAVs)** are the next technical revolution.

Goldman Sachs forecasts a $100B drone industry by 2020 based on market demand.[1] Multiple sectors have already discovered why, as these small wonders go about streamlining workplace operations and reducing costs in areas such as asset and facilities management, inspection and maintenance, surveying and mapping, progress monitoring, emergency services and other highly successful applications.

In this report, we'll look at how drones are transforming day to day tasks in a sampling of industries, and describe the top use cases and opportunities for operational efficiency in each. Also included is a discussion on general drone capabilities. New uses are emerging quickly as professionals like you consider how to use drones to solve problems within your own industry and operations.

Drone use in the Construction industry alone grew 239% in the last year, and Agriculture "lagged" behind at 172%.[2] These triple digit growth examples reveal a new paradigm coming our way. Not long ago, aerial views required expensive rentals of planes, helicopters, pilots and more, with costs out of reach for all but the largest companies or governmental agencies. Now, we'll soon see 'drone nests' being built right into industrial assets the way birds nest in trees.

As drone experts, FlyGuys can help you navigate this new territory. Our engineers and nationwide pilot network are standing by to enable exciting new solutions.

Better crop health, higher yields

One of the leading industries to implement UAVs is Agricultural. Drones help farmers, growers and ranchers increase profits by reducing costs and increasing yields. In 2015, the American Farm Bureau Federation found that the average return on investment (ROI) for farmers using drones was "$12 per acre for corn, $2.60 per acre for soybeans, and $2.30 for wheat."[3] These strong ROI numbers have led to a booming growth for drones in the Agricultural industry, 172% in just the last year.

Drones help growers apply Precision Agriculture techniques for better crop and livestock management. With drone aerial imagery, analytics and payload services, farmers can quickly assess and manage small to industrial growing operations at low cost. Drones allow ongoing data gathering about crop and soil conditions, water levels, plant health and more.

Top Uses of Drones in Agriculture

3D Mapping for Crop Planning and Preparation
By collecting images of large areas within crop boundaries, drones help you pinpoint the best locations for planting specific crops. Drone imagery can also reveal needed landscaping and potential hazards, such as flood dangers, that might occur planting, allowing you to plan layouts before planting. 3D views can also be used to optimize drainage systems, saving water resources.

Seed, Fertilizer and Product Dispensing
According to a drone planting project done with Worldview International Foundation, drone planting is 10x faster than human hands, allowing a pilot with 6 drones to achieve 100,000 seeds planted in a day. Drones can also survey fields regularly to identify issues affecting plant heath in micro areas, such as low nitrogen or pest problems. Drones with payload capabilities can then apply the needed product at the right spots, reducing over-application and materials waste. Compared with workers walking acres of rows to identify and remediate these same issues, drones are tremendously more efficient.

Top Uses of Drones in Agriculture (continued)

NDVI Data to Assess Plant Health

Gathering NDVI (Normalized Difference Vegetation Index) data is used identifying crop problems early enough to be proactive. Drones equipped with NDVI cameras enable frequent monitoring of crops easily and often at a much reduced cost compared to helicopters, which can easily cost $1,500 per hour.

Thermal Imaging to Gauge Soil Temperature and Water Levels

Ground level surveys can make it difficult to notice minor leaks until they become major. Use thermal imaging data supplied by drones to stay on top of water usage, water movement and to identify leaks or clogs in your irrigation systems can be invaluable in keeping costs down and plants healthy. What's more, thermal imaging can gauge soil temperature before planting tender and expensive seedlings, allowing you to speed crop cycles while ensuring young transplants are protected from being planted in too hot of soil.

Forest Stewardship Support

Private owners or public organizations in charge of large tracts of wild forest or rural land use drones to formulate land management plans and to monitor the health of their acreage. Drones imagery helps p**redict and mitigate disasters such as forest fires, landslides, and ecological disease. Drone surveying also supports due diligence needs for aid program applications,** such as the Forest Stewardship Program, the Landowner Assistance Program, or USDA assistance programs.

Livestock Management: Manage Resources and Monitor Stock

Drones are used in Livestock Management to obtain a comprehensive inventory of resources, such locating the best areas for drinking water and creating a superior grazing management plan. They help easily monitor fencing and pen conditions, check for damage after severe weather, and support counting and/or locating missing livestock, including at night when required using infrared imaging.

AGRICULTURE

Case In Point: Prescriptive Materials Application Saves Money, Reduces Waste

In a specific instance, a Missouri farmer decided **to use drones** to plan his fertilizing regime. Previously, he had been applying the fertilizer at about 50 lbs. per acre uniformly.

After a 20 minute flight and 250 drone images later, the farmer had an orthomosaic picture of his field, and NDVI images that revealed subtle differences. This data was used to create a prescriptive plan for fertilization, reducing the costs of materials and producing a much better yield. Continuous imaging would also create a “soil history” for later use, which could help with later planting seasons and crop rotation.

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Worksite Planning through Completion

Construction is a top industry for drone usage, with growth of 239% over the last year. Drones are often faster and cheaper for many tasks, including surveying and plotting of sites, monitoring progress and materials, performing inspections, maintaining security and marketing for sale. Using drones helps architects, engineers and construction project managers gain greater control to keep projects on time and on budget.

Top Uses of Drones in Construction

Site Surveying and Mapping for Construction Prep
Aerial images of your job site can be an amazing project support tool. From the beginning, you can perform site surveying and mapping to better plan the use of time/labor, identify landscape issues, locate potential hazards, and assess the best areas to break ground.

3D Modeling for Progress Monitoring and Digital Twin
Drone scans using LIDAR (Light Detection and Ranging) can provide 3D models of worksites for progress monitoring during the build process, allowing site managers to track workflow and materials whether on or off site, ensuring all parts of the site are kept on track. These views efficiently demonstrate materials stock levels and usage rates to help with project management, accurate ordering and theft detection. Progression images can be shown to clients to document milestones. And by combining photogrammetry and 3D modeling, a full digital twin of a site can be created to help with communications between team members and stakeholders.

Perform Safer Inspections
Drones excel at remotely inspecting high structures, a potential leak, or unstable structures. On construction worksites, they help pinpoint hazards and allow responders to handle the issue with the right tools and components the first time, further reducing risk to personnel. A better safety score protects workers and rewards builders with better insurance rates and better relationships with employees, clients and regulators.

Thermal Imaging for Detecting Construction Issues
Drone thermal images can spot flaws and hazards before they develop into major issues that cost more to repair. Find electrical hot spots from overloaded circuits or loose, damaged wires. Identify problems with heat loss or air infiltration, where insulation seals may have been missed, especially for roof inspections where drones can easily locating cracks where heat or moisture can pass through.

Case In Point: Drones + VR Enable 'Walk Through' Before Construction

Brasfield and Gorrie, a large US construction firm, is an early user of drone technology, incorporating drones and mapping software compatible with BIM (building information modeling) and virtual reality software into their plans for a hospital. During construction, hospital employees got virtual tours of the building. The resulting feedback was incorporated into their designs, helping to place medical equipment and medical gas outlets. The company also compared the actual site image with the designed image, revealing where extra soil was needed to achieve needed elevation. Allowing team members to "view" the site without risk is a large reason why the company has integrated drones into their projects.

Medbots of the Future

From aiding in search and rescue (SAR) operations, supporting disaster preparedness and recovery, transportation of emergency supplies, and acting as temporary infrastructure replacement in crisis, drones can now help responders and those in the path of disaster every step of the way. The emergency services field is associated with life-threatening situations, dangerous environments, and time-sensitive operations – in each, real-time data can mean the difference between life and death. It's no wonder the sector is being revolutionized by drone technology. With over 347 US agencies employing drones and an industry growth of 518% in two years, drones are flying to the rescue.

Top Uses of Drones in Emergency Services

Aerial Imaging for Disaster Preparation
Drones are being used to improve preparation and response at all stages of disaster. Pre-event, drone aerial imaging can help plan the best evacuation routes, pinpoint potential disaster areas, assess environmental conditions, and inspect key infrastructure where weakened condition or failure might impact life and property, such as levees and waterways during a flood. During a disaster, drone imaging supports rescue operations, communications, search and rescue and more. Afterwards, the data can help insurers assess damages quickly and safely en masse, streamlining rebuilding efforts.

Thermal Imaging in Search and Rescue, Firefighting
Infrared cameras capturing aerial imaging via drones have been proven successful in search and rescue efforts. The software is sensitive enough to pick up heat signatures at any time of day, through dense underbrush or structures, allowing teams to lengthen the amount of time spent searching. It can cover a larger area quickly, providing information for teams to quickly pinpoint survivors and plan retrieval with minimal risk to personnel. Another rising use of drone thermal imaging is in firefighting, allowing crews to detect hot spots before they erupt, and supporting plans for setting backfires. and be used to locate leaks and anomalies in infrastructure and energy sites.

Top Drone Uses in Emergency Services (continued)

Transporting Supplies, Providing Temporary Communications in Disaster Recovery
UAVs are being used to bring needed medical supplies to isolated hospitals and remote areas. Cost efficient and quick to respond, the ability to send out water and food by drone to areas hit by disaster buys survivors time for more substantial aid to arrive. After disaster has struck, re-establishing communications is key to recovery and rebuilding efforts. Tethered drones, with their power supply in continuous flow from the ground, can act as temporary cell towers 24/7, providing phone service and wifi.

Surveillance, Security and Law Enforcement
Tethered drones are aiding in security efforts, providing dynamic and consistent views of events that speed up response time in case of threat. Aerial data, including infrared, is also leveraged for locating suspects on the run, crime scene analysis, and in traffic collisions, where a birds-eye view helps recreate the circumstance.

Case In Point:
Drones Pinpoint Hot Spots When Helicopters Were Grounded

One of the greatest achievements by drones is their ability to fly in conditions that prohibit other flights. California has been dealing with seasonal wildfires for quite some time, and the firefighting teams are using every tool they can to minimize damage and prevent losses. During one such summer of fires, smoke conditions grounded helicopters, something that would normally inhibit firefighting efforts. Instead, the crews sent drones up through the smoke, using them to locate where fires had broken out so they could evacuate the areas at risk and keep smaller fires from growing into larger ones.

Easier Inspection of Distributed Assets

Water, electricity, gas, communications: all of these utilities are necessary for a civilization to function. Continuous maintenance on energy structures is time consuming and expensive, and often risky. Enter drones, which can quickly inspect energy assets such as transmission lines, wind turbines, cell towers, solar farms and pipelines from above, while crews keep their feet safely on the ground. Drones are especially useful in the Energy and Utilities sector as they can easily range from vertical heights to lengthy distances. Drones help identify problems based on actual asset condition with great detail and accuracy, helping asset managers both increase service reliability and extend asset lifespan.

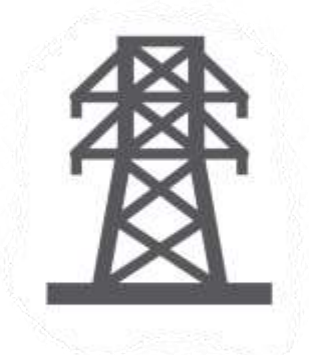
Top Uses of Drones in Energy and Utilities

Aerial Inspection with Condition Endurance

Using a drone to inspect pipelines, waterways, transmission lines means covering great distances quickly and inexpensively. Use Thermal Imaging for leak detection and temperature anomalies, as well as indicating the best placement for solar arrays and exposing electrical current ranges of solar strings. Drones also provide greater efficiency over hands-on inspections since they are built to withstand harsh conditions, and can be deployed without costly shut downs for assets such as flare stacks and wind turbines.

Identify ROW Encroachment

Vegetation and other Right of Way (ROW) encroachments cause both maintenance and safety issues. Drones are now used for Vegetation Management Inspections for Transmission and Distribution lines, pipelines and solar arrays, which helps companies to pinpoint and prioritize areas that need addressing for high efficiency. Transmission line owners also use PLS-CADD (Power Line System Computer Aided Design & Drafting) combined with drone LIDAR data to provide greater modeling around ROW encroachments, and to perform sag-tension analysis to identify ratings discrepancies. Drone survey maps are used for better site selection of new assets, preemptively reducing encroachment.



Top Drone Uses in Energy and Utilities (continued)

Improved Environmental Assessments and Compliance

Drones can monitor pipelines and related assets, gathering comprehensive data for environmental impact assessments and helping to identify and avoid previously hidden problems. The granular, real-time data rapidly captured by drones provides granular imaging for better environmental stewardship and regulatory compliance documentation.

Underwater Drones for Pipes, Dams, and Canals

Underwater drones are now used to more safely and efficiently inspect intake pipes, dam structures, and canals in areas previously difficult and hazardous to reach. Reducing risk to personnel and able to see more clearly in murky water, submersible drones are speeding and simplifying aquatic inspections for less cost.

Case In Point: Saving Up to 90% on Ice Boom Inspections

In 2017, the New York Power Authority partnered with Ontario Power Generation to explore using drones for inspecting an ice boom between Niagara River and Lake Erie. The ice boom is a series of floating cables and pontoons placed to reduce the amount of ice build-up at the hydro-electric water intakes. Could drones make the process quicker, cheaper, and more environmentally conscious? The drone flew for 20 minutes, allowing the team to identify a damaged cable and to create a plan of action. The NYPA's research team estimated that using drones instead of helicopters or ground teams would save over 90% of the current cost of inspections, while increasing worker safety.

Drone in One

FlyGuys was invented on a golf course as founders considered how drones 'see' around corners and far past blind shots - and then wondered where else drones could 'see' past blind spots that would matter. A drone's ability to capture stunning visual footage from rare aerial vantage points can improve a golf course's bottom line, by ensuring your course gets the marketing visibility needed for success and easier maintenance processes that promote a healthy, beautiful course.

Top Uses of Drones in Golf Courses

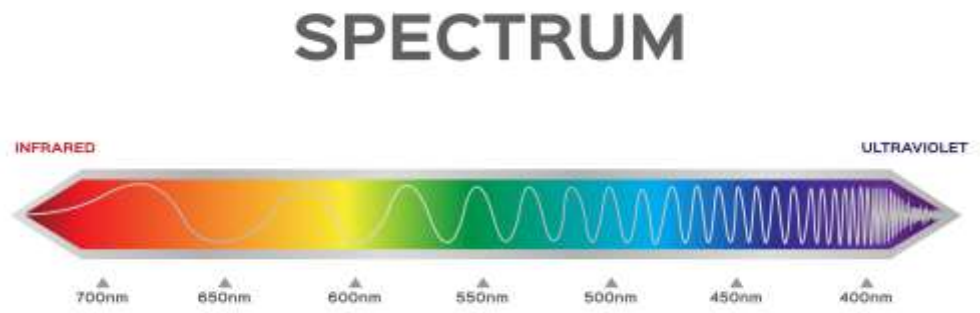
Improve Marketing with Beautiful Aerial Video
Having a professional virtual tour of your golf course online can help you get more booked tee times. Today's players research courses before booking, and a video showcasing your property is just the thing to get attention, especially when you can showcase unique property features, landscaping, and services.

Topographical Mapping for Landscaping and Construction
Aerial images of the property can help with landscaping needs and construction planning. Much more cost efficient than helicopter flights, which often charge as much as $1500 per hour, the topographical data provided is perfect for knowing land features that help with layout and where to put crews to work. making your maintenance crew more efficient.

Top Uses of Drones in Golf Courses (Continued)

Course Maintenance with Thermal Imaging and NDVI

Golf courses are often an island of green in an otherwise dry or urban landscape. Water, nitrogen and other landscape materials required to maintain courses is costly. Now, golf courses can be mapped by drones with thermal imaging and NDVI output to analyze soil and turf health. This helps to focus maintenance needs and resources, since you can address only the areas needing water, fertilizer, pest control or other remediation – even before becoming apparent at the ground level.



Digital Yardage Book: Drive Sales with Custom App

Physical yardage books are quickly becoming obsolete, and being replaced by a virtual twin of the course. The FlyGuys proprietary Digital Yardage Book app allows players to see each hole from the ball's perspective, eliminating blind spots and helping with club selection and score improvement. Where past yardage books only provide distance to the hole, aerial photogrammetry can also add elevation information. This app is also the perfect platform for advertising to your players, whether you have a restaurant, club shop, or golf deals.

Case In Point:
Drone Video Reduced Golf Course Treatment Time by 96%

One private golf course in Florida has found drones invaluable in course maintenance, reducing inspection costs and **reducing treatment time by 96%** due to early detection. By the time a fungal outbreak or water leak becomes apparent at the ground level, it is often costly and difficult to treat. During one maintenance inspection flight over the Florida course, an early fungus issue was identified, as well as a faulty sprinkler head, which was quickly

Better Marketing, Faster Sales

A great real estate agent knows that better marketing means more closed deals. Ground level photography is time consuming and can miss many great features about a home or commercial property. Drones have had great success in upgrading both residential and commercial property listings with aerial video, photos and virtual tours. Showcasing the property from every angle is ideal for larger homes and large lots, and context footage of surrounding towns and amenities is helping buyers to imagine their life in a new environment. According to the Multiple Listing Service, properties that feature aerial images sell almost 68% faster than those without them.

Top Uses of Drones in Real Estate

Provide 360° Views of Structure and Surroundings
Add value to listings by capture sweeping sky views. For larger properties, aerial views are spectacular. However drones bring drama to any listing affordably, generating more and better offers. Drones can showcase unique interior and exterior features such as architectural facades, pools or tennis courts; and highlight neighborhood benefits such as nearby parks, schools, shopping and commuter routes.

Immersive Virtual Video Tours
Drones can help demonstrate a property's interior flow by flying at eye level, allowing clients to move virtually from room to room. Even prospective buyers from out of the area will have a stronger level of confidence in pursuing a property with the life-like virtual tours, since they mimic the experience of an in person visit so well.

Top Uses of Drones in Real Estate (Continued)

Thorough Inspections and Appraisals

Drones support real estate insurance inspections and property appraisals several ways. Using thermal imaging, drones detect leaks and heat anomalies that may mean damaged insulation, and general surveying of the property. They also give you a perfect vantage point of the roof, an asset that is difficult and dangerous to survey. Identifying issues with photographic documentation reduces human errors and helps ensure fewer roadblocks in the sales process.

Simplified Property Management

Drones help fill open units faster by supplying compelling, detailed aerial images of property interiors and exteriors. Aerial video helps buyers see the local lifestyle with views of the local area and its services. Property managers also use drones to inspect and maintain properties more efficiently, easily checking roofs, gutters, landscape, thermal or insulation issues and more. Drones are used to ensure HOA compliance, easily covering large common areas and grounds. Even during construction, drones are used to demonstrate the view from upper floors once the building is finished, ideal for securing investors and tenants.

Case In Point:
44% of NAR Members Use Drone Services

The National Association of Realtors reports that over 44% of its members are already using drones to aid their listings, and predict that number to continue growing. The NAR continues to be active in working with the FAA and Congress to further the use of drones in the industry.

Ortho, Thermal, LIDAR, HD & More

As the expert in your own business environment, you no doubt have questions and ideas about deploying the right drone technology. Listed below are many of the most often used drone imaging capabilities to help you understand what's some of what's in use today.

Drone Imaging

HD Aerial Imaging
Our HD stills and videos are ideal for inspections and marketing.

Multispectral Imaging
Infrared and thermal imaging are captured with heat sensors. Resulting images clearly show temperature gradations and

Orthomosaic Imaging
Stitching together multiple high-definition images results in a large composite overview of the image area. This imaging type is also paired with photogrammetry techniques to get accurate measurements and remove perspective distortion.

LIDAR (Light Detection and Ranging)
Providing topographical and geographical information, this image type is used to create 3D digital models of land, assets and materials for measurement and monitoring operations.

3D/Volumetric
Taking the raw data and using 3D modeling software, this image type can be rendered into a virtual twin of assets, facilities, land areas or other use case. Perfect for progression updates, construction planning, and asset management.

Drones Imaging (Continued)

NDVI

The Normalized Difference Vegetation Index pairs perfectly with drone surveying. NDVI is an analysis tool from drone imaging that helps identify crop or forestry health issues, leading to better insights about where treatment is needed and the best course of action.

Time Lapse

By having pre-programmed flight patterns, drones are able to complete regular flights over the same area, providing you a time lapse comparison of a construction project. Using LIDAR and 3D modeling, drones can show changes in material stocks and other data useful for site managers.

Emerging Drone Technology

The speed of drone technological evolution is lightning fast. From Intel's drone chips increasing visual data capabilities, to tethered drones maintaining flight 24/7, to Internet of Things sensors and devices to that will shed unparalleled light on data not yet on the radar – drones are truly a unique platform of possibility.

Nationwide Drone Services

This report shares just a sampling of the many ways drones are used to greatly increase efficiency. Whether using drones to help with inspections of your assets, measuring and improving crop health, or supporting critical communications during disasters, drones are ready and able to support your efforts. No project is too small for these intelligent mini-copters.

The FlyGuys Advantage

Across the drone ecosystem, FlyGuys improves outcomes. We deliver value, including vastly improved operational efficiency and ROI for clients in industries as diverse as agriculture, entertainment and emergency services, along with better business results at lower cost and less effort for professional drone pilots. FlyGuys is drone technology agnostic; we apply the right combination of off the shelf solutions to fit your particular needs, supplementing with custom development when useful.

The FlyGuys Mission Quality Management approach and technology ensures the best outcomes every step of the way, from job scoping, data capture, media processing and analysis to final delivery. We guarantee high quality, consistent results no matter where your job is or how many locations. All FlyGuys Pilot Partners are professionally certified, FAA compliant, and insured.

Talk to us about our low-cost Proof of Concept program, helping businesses like yours bring transformative custom drone innovations into your operations.

For More Information or Free Consultation

Get in touch with us today, let us help you bring the operational efficiency of drones into your organization.

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