



# FUTURE TRENDS IN ROADWAY CONSTRUCTION

The Role of Drones and  
Innovative Technologies



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# 0 Intro & Panel

**PAGE 3**

---



# 1 The Growing Role of Drones in Construction

**PAGE 5**

---



# 2 Smart Targets and Precision Data Collection

**PAGE 7**

---



# 3 Data-Driven Decision Making in Construction

**PAGE 9**

---



# 4 The Integration of AI in Construction Technologies

**PAGE 11**

---



# 5 Looking Ahead - Preparing for the Future of Construction Technology

**PAGE 12**

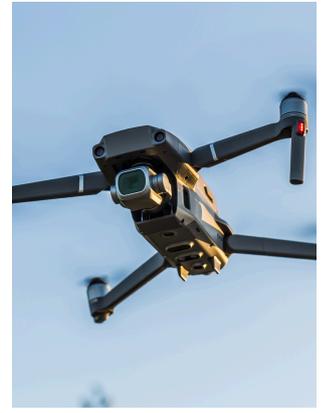
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Table of Contents

# CONTENTS

# The INTRO



**The heavy civil construction industry is rapidly evolving with the integration of drones, smart targets, and AI-driven analytics, transforming traditional approaches to surveying, planning, and project management.**

The construction landscape, particularly in the heavy civil sector, is undergoing a significant transformation. With the introduction of advanced technologies such as drones, smart targets, and AI-driven data analytics, the industry is witnessing a paradigm shift in how surveying, planning, and project management are approached. The importance of these technologies was clearly illustrated during the **Future Trends in Roadway Construction** webinar, featuring insights from key industry professionals: John Cooper (Birdseye Aerial Drones),

Larry Donelson (Interra), Dallas Thompson (Datumate), and moderated by Troy Parkinson (Sage Presence).

This e-book delves deeper into the role of innovative technologies and presents practical examples of how these advancements are being applied in the field. If you're a surveyor, engineer, or construction manager specializing in heavy civil projects, this guide will give you an edge in adopting and leveraging cutting-edge solutions to improve efficiency, accuracy, and safety on your construction sites.



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# THE PANEL



# 1

## The Growing Role of Drones in Construction

### DRONES HAVE BECOME CRUCIAL IN CONSTRUCTION FOR IMPROVING SAFETY, REDUCING COSTS, AND SIGNIFICANTLY ACCELERATING TASKS.

Drones have advanced from being experimental gadgets to indispensable tools on construction sites. Their applications extend from surveying to inspections, and even to monitoring the progress of large-scale projects. As John Cooper noted, **“The advantages are clear—you save time, you enhance safety, and you achieve very precise results. The real game-changer is the ability to collect this data without the need for people in dangerous environments.”**

#### The Safety Imperative

Drones play a vital role in ensuring worker safety by minimizing the need for human presence in potentially hazardous areas. Cooper expanded on the safety benefits by referencing a utility inspection project: **“We’ve been able to mitigate risks of flying over sensitive infrastructure like power lines, reducing accidents by taking manual inspections out of the equation.”**

Larry Donelson also highlighted the potential safety gains, particularly in busy urban settings where roadwork takes place.

**“Smart targets and drones allow us to collect data without sending surveyors into traffic. It’s about getting the information you need while keeping people out of harm’s way,”** Donelson said, emphasizing how drones have transformed safety practices in construction.

#### Efficiency Through Automation

The time-saving potential of drones in data collection is remarkable. Traditional ground surveys can take days, even weeks, while drones can survey the same area in a fraction of that time. **“For corridor projects or long stretches of road construction, drones cut down the time needed for surveying by up to 60%,”** Donelson explained. **“A survey that might have taken a week now only takes a day.”**

Drone technology isn't just about quick data collection; it also significantly reduces costs. **“The time you save on surveys directly translates to cost savings,”** Cooper noted. **“You’re reducing man-hours, minimizing the need for expensive equipment, and completing projects faster—all of which improves your bottom line.”**



## CASE STUDY: FLORIDA TO PENNSYLVANIA CORRIDOR SURVEY

Donelson shared a specific project involving a transportation corridor in Pennsylvania where his team used drones to perform surveys. **“We flew over a corridor that spanned hundreds of miles, collecting data that would have taken weeks using traditional methods. Our drones captured the site within hours, and we were able to process and analyze the data in real time.”** He went on to explain how real-time data collection allowed for immediate decision-making, which kept the project moving ahead of schedule.



# 2

## Smart Targets and Precision Data Collection

### SMART TARGETS WITH DRONE TECHNOLOGY HAS REVOLUTIONIZED GEOSPATIAL DATA COLLECTION.

The marriage of drone technology with precision tools like smart targets has revolutionized geospatial data collection. Smart targets, which serve as ground control points (GCPs), enhance the accuracy of drone-captured data and enable construction professionals to generate actionable insights without the delays of traditional methods.

#### **The Critical Role of Ground Control Points**

Ground control points are essential to ensuring the accuracy of drone-captured data. As Cooper explained, **“You’ve got to have GCPs in your aerial data. These points tie your data to exact locations on Earth, ensuring the 3D models and topographic maps you create are precisely where they should be in relation to the site.”** Traditionally, GCPs were collected by surveyors, but smart targets have streamlined this process.

Donelson highlighted that smart targets are not only more efficient, but they also drastically reduce costs: **“With smart targets, you don’t need to wait six weeks for a surveyor to verify your site data. The moment you fly the drone, you get the information you need. That’s a game changer for projects on tight timelines.”**

#### **Enhancing Accuracy and Reducing Errors**

As Dallas Thompson from Datumate noted, **“Smart targets are critical when you need to compare design files to real-world conditions. Without precise ground control, your drone data won’t align with the BIM models or CAD files, making it impossible to accurately monitor progress.”** He elaborated that in large projects, such as highway construction, small discrepancies in data accuracy can lead to major issues down the line.

Donelson echoed these sentiments, emphasizing that **“knowing where your project is in the world, down to the centimeter, is crucial. This kind of precision is especially important for contractors working on DOT (Department of Transportation) projects where the stakes are higher, and errors are costly.”**



### Smart Targets in Action

John Cooper shared an example of how smart targets simplified a complex drone survey in a remote area. **“We were surveying a large area with a lot of terrain variation. Traditionally, this would have required dozens of GCPs, but with smart targets, we were able to use fewer points while still maintaining high levels of accuracy. It saved both time and resources.”**



# 3

## Data-Driven Decision Making in Construction

### DRONES ENABLE REAL-TIME, DATA-DRIVEN INSIGHTS IN CONSTRUCTION, IMPROVING DECISION-MAKING.

One of the greatest advantages of modern drone technology is the ability to generate real-time, data-driven insights that improve decision-making on-site. By leveraging drones for progress monitoring, safety audits, and material tracking, construction professionals can make informed decisions faster and with greater accuracy.

#### **The Power of Progress Monitoring**

Progress monitoring emerged as a critical use case for drone technology during the webinar. A poll conducted during the event showed that **63% of respondents** cited progress monitoring as the most beneficial aspect of using drones in construction.

Larry Donelson explained, **“Today’s project managers want immediate feedback. Drones enable them to see where they stand—whether they’re 19% or 35% complete—at any given moment. This helps ensure that they stay on track and can adjust plans in real-time.”** Donelson highlighted that the ability to track and measure progress so precisely has significantly reduced project overruns.

#### **Monitoring Stockpiles and Material Management**

Another critical application of drones is in managing stockpiles and materials. Dallas Thompson pointed out, **“With drones, you can monitor the volume of materials—like gravel or concrete—being used on-site. This monitoring is invaluable because it helps contractors know when they’re running low on materials or whether they’ve brought in too much.”** By reducing over-ordering and minimizing waste, drone data helps projects stay within budget.

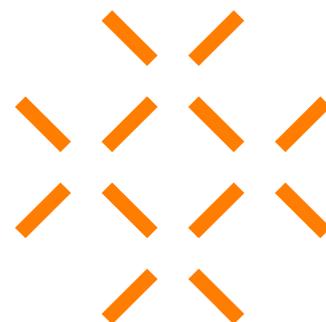
Cooper shared a real-world example: **“We used drones to monitor stockpiles on a large construction site in California. The data allowed the contractor to optimize their material orders and eliminate excess deliveries, saving thousands of dollars.”**



### **Minimizing Rework and Improving Precision**

Another benefit of using real-time drone data is the ability to catch mistakes before they escalate. **“If you catch errors early, you save money and time,”** Thompson explained. **“With drones, you’re not waiting weeks to discover a mistake in grading or material placement—you can catch it the same day.”**

Donelson echoed this sentiment, stressing that **“rework is the silent killer of budgets. The sooner you can identify discrepancies between design and reality, the fewer mistakes you’ll make, and the less rework you’ll need.”**



# 4

## The Integration of AI in Construction Technologies

### THE INTEGRATION OF AI WITH DRONE TECHNOLOGY IS AUTOMATING INSPECTIONS AND ENABLING PREDICTIVE ANALYSIS.

Artificial intelligence (AI) is now becoming integral to how drones and data collection tools operate. By integrating AI with drone technology, the industry can automate more processes and provide even more detailed insights. AI also allows for predictive analysis, which can be invaluable in both project planning and ongoing management.

#### **AI for Predictive Maintenance and Inspections**

John Cooper talked about how AI has already been implemented in drone inspections for utilities and infrastructure. **“We’ve been testing AI to automatically identify issues like cracked pavement or broken transformers. By automating these inspections, we’re able to gather actionable data faster and without the need for specialized human analysis,”** he said. AI enables drones to perform tasks that would normally require manual inspection and expert interpretation.

#### **Automation of Construction Equipment**

Dallas Thompson looked even further into the future, suggesting that fully automated construction equipment is on the horizon. **“We’ve already seen machine-controlled bulldozers and excavators. I think it’s only a matter of time before we have fully autonomous machinery, driven by AI, that can dig trenches and grade roads without human intervention,”** Thompson said.

#### **AI and Real-Time Analytics**

Larry Donnelson highlighted the role of AI in providing real-time analytics during construction projects. **“We’re already using AI to analyze real-time drone data, helping contractors make better decisions on the fly. Whether it’s identifying areas where more material is needed or predicting when a project will fall behind, AI is allowing us to stay proactive rather than reactive.”**

# 5

## Preparing for the Future of Construction Technology

### THE FUTURE OF CONSTRUCTION WILL INCREASINGLY RELY ON DRONES, AI, AND GEOSPATIAL TOOLS.

As we look toward the future, it's clear that integrating drones, AI, and advanced geospatial tools will become even more crucial in the construction industry.

**“We’re only scratching the surface of what’s possible,”** Cooper noted during the webinar. **“With longer flight times, faster data processing, and better AI, the capabilities of drones are only going to expand.”**

#### **Longer Flight Times and Enhanced Drone Hardware**

Thompson pointed out that hardware developments are also driving change: **“Drones are going to be able to fly longer and faster, cover larger areas, and capture more detailed data. This is going to make them even more useful for large-scale projects like highway construction and airport development.”**

#### **The Expanding Use of AI**

AI’s role in construction will likely continue to grow as well. **“The future of AI in construction isn’t just about drones,”** said Donelson. **“It’s about integrating AI into every stage of a project—from planning and design to construction and post-construction monitoring.”**

By doing so, contractors and engineers will be able to reduce errors, minimize waste, and deliver projects faster and more efficiently.

#### **Conclusion**

The heavy civil construction industry is on the cusp of a technological revolution. Drones, smart targets, and AI are no longer futuristic concepts—they are tools used daily to improve safety, reduce costs, and drive efficiency. As John Cooper aptly put it, **“The time is now for companies to move beyond traditional methods and fully embrace the benefits of these technologies.”**

By adopting these innovations, you can position yourself and your company at the forefront of the industry, ensuring success in an increasingly competitive and data-driven world.

