# Unmanned Aircrafts for Mapping and Inspection

Introduction

Drones have been in wide use starting around half a decade ago. Before 2016 only manned aviation pilots were allowed to fly drones commercially. Since then, the Federal Aviation Administration has set up a program to allow drone users, not currently pilots, to receive training and become Part 107 certified. This opened up the doors for use in the industry and drones have been widely used ever since.

From the start, drones were used as inspection tools relaying a video signal back to the user allowing them to view areas not accessible or safe. Given the increase in usability and better tech allowed for many more features to be added to these aircrafts.
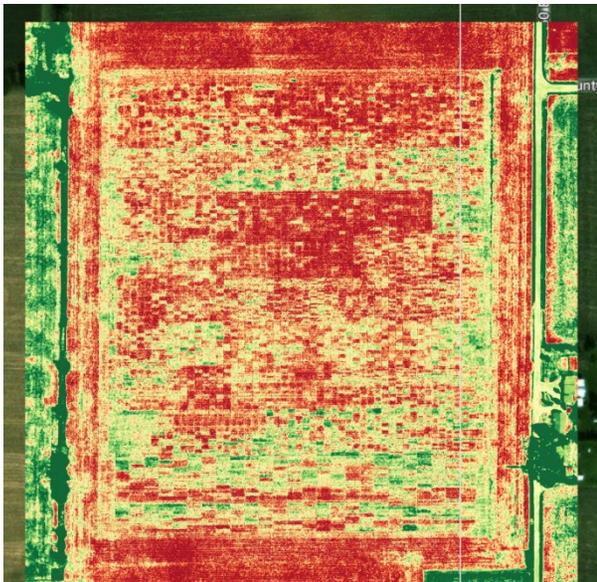
Crop Health

INGENIUM DESIGN

Applications and Uses

- Feasibility Studies

- 3D Structure Models

- Elevation Profile, Topography

- High Resolution Mapping

- Vertical Structure Mapping

- Crop Health

- Inspection

Drones are capable of creating large 2D and 3D models, similar to Google Earth's models but of much higher quality (see photos of point cloud models to the right). Unmanned aircraft systems are perfect for creating models of large and hard to reach areas. Land development, pipelines, construction sites, and as-builts are an example of a few of these areas. Apart from creating 3D structures, drones are perfect for creating high resolution/non distorted maps. These maps can also be created in a vertical fashion to get a high-resolution map of the side of a structure. Landscape model measurement can be used to find how much material is in a stockpile or even a mountainside.


3D model of our office

A new landscape feature we offer is crop health assessment. By scanning a field multiple times in a season, an analysis can be performed to determine which areas grow best and where other areas might be struggling. This leads to informed

2D mapping of our office

decisions on watering, fertilizing, and other care that makes farms more profitable.
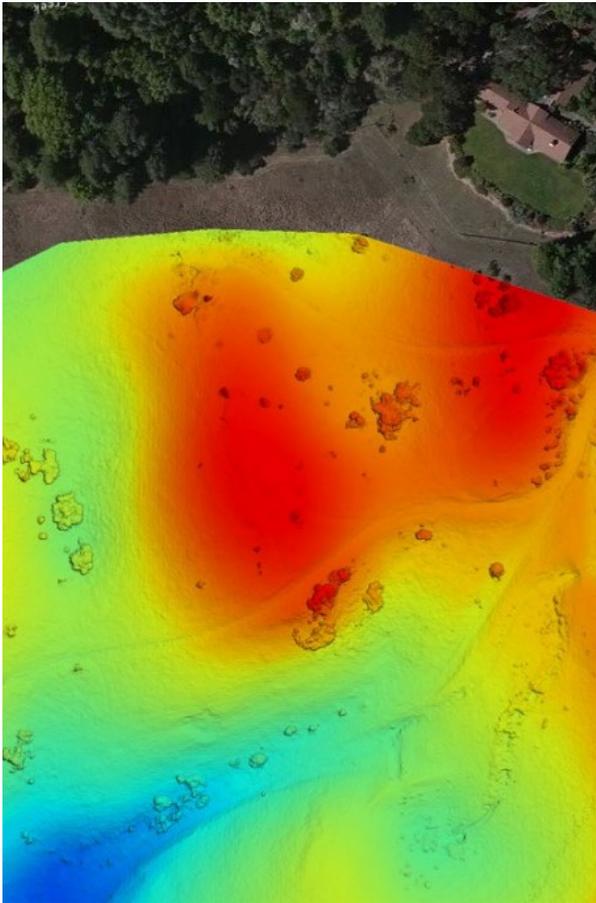
Elevation Profile for Conceptual Layout

Limits and Accuracy

- *1-10 cm relative accuracy*

- *Primarily for viewing purposes. **Not surveying grade**.*

It is important to note that image-based drone models are less accurate compared to terrestrial laser scanning or lidar based drone systems. The advantage, however, is in the mobility and range of use over surveying techniques. The accuracy of

drone models can depend on many conditions like lighting, height of aircraft, and fixed or non-fixed geometries (like wavy grass in the wind or a fixed building). However, the accuracy of an image-based drone is 2-5cm horizontally and 4-8cm vertically for 3D models. 2D maps are closer to 1cm accuracy.

What's Next

As positioning and lidar system become more light weight and powerful, drones are getting very close to survey grade quality. RTK or real time kinematics is a satellite positioning technique that allows the drone position to be within 1cm of absolute accuracy. Powerful lidar systems equipped with photogrammetry sensors make mapping very precise. Using this technology over traditional methods can save significant time and cost.

Rest assured that all Ingenium Design's flight operations are part 107 certified and insured. Please reach out if you are interested in viewing

a model so we can send you a sample. Choose Ingenium Design for your next mapping project.

3D Model Detail Closeup

Let's not make this hard!

3D Model of the historic old mill