



Creative Construction Conference 2017, CCC 2017, 19-22 June 2017, Primosten, Croatia

Unmanned Aircraft System Applications In Construction

Mark C. Tatum*, Junshan Liu

*Auburn University, 219 Miller Gorrie Center, Auburn, AL 36849, USA
Auburn University, Miller Gorrie Center, Auburn, AL 36849*

Abstract

Technology advances in recent years have resulted in Unmanned Aircraft System (UAS) designs that are more reliable, less expensive, and easier to control. This research looks at the current use of UASs within the United States construction industry. Areas of focus include risks associated with using UASs on construction sites, in-house versus outsourced resources, and a look at the future of UAS applications in construction. Survey results indicate many US companies use UASs on their sites with the majority of applications replacing traditional still photo and video acquisition. In addition to traditional uses of photographic information, photogrammetry software is being used to integrate this data into building information models. In August of 2016, the US Federal Aviation Administration issued new regulations creating a Remote Pilot Certificate and defined requirements for commercial use of Unmanned Aircraft Systems. This paper looks at current and projected uses of UASs in the construction industry.

© 2017 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the scientific committee of the Creative Construction Conference 2017

Keywords: Drones; UAS; UAV; Unmanned Aerial Vehicles, Unmanned Aircraft Systems

1. Introduction

An Unmanned Aircraft System (UAS), often referred to as a drone, is an aircraft system that is flown by a pilot on the ground. The system includes the drone itself as well as the control system, ground and satellite based equipment, communication links and operator which are required to operate the aircraft effectively and safely. The term drone in other applications may also broadly refer to any equipment operated independent of human control [4]. Another commonly used term is UAV which stands for Unmanned Aerial Vehicle. In the United States, the Federal Aviation Administration (FAA), published regulations establishing the requirements and limitations for using UAS's

* Corresponding author. Tel.: +1-334-464-5426
E-mail address: mtatum@auburn.edu

in commercial applications. This comes under Federal Aviation Regulations (FAR) Part 107 Small Unmanned Aircraft Systems (sUAS).

Military use and research has been a major driver for advancing UAS technology. The wide use of transistors in the 1960's allowed electronic equipment to shrink in size, and the civilian hobby of radio controlled aircraft began to develop in parallel to military UAS advances. More recently in the 2000's, 2.4 GHz spread spectrum technology was introduced, which allowed multiple UAS operators to use their equipment in the same area without interfering with each other. The introduction of Lithium Polymer (LiPo) batteries provided another advance by providing more voltage and amperage per cell than previous technologies. The advancement of GPS technology has allowed both military and civilian UAS's to be navigated via a satellite data link [1].

Prior to publication of Part 107 the FAA issued authorizations for certain UAS commercial operations on a case by case basis. The data from over 1400 applications for these special authorizations, known as Section 333 exemptions, revealed that the largest number [9] were issued to companies in the film and television industries [3] which falls under the category of aerial photography and videography.

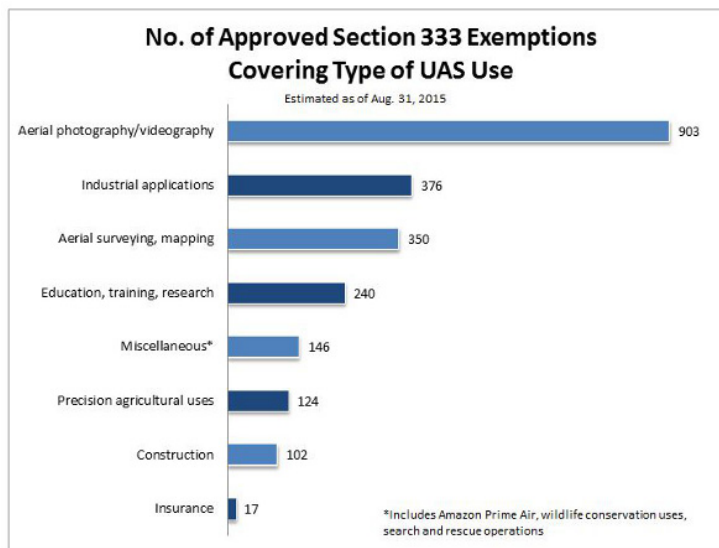


Fig. 1. Categorical Breakdown of Section 333 Exemptions [9].

Industrial applications for UASs are the second most popular category. Some of these applications include inspection of critical linear infrastructure such as oil and gas pipelines or electrical transmission lines [10], inspection of wind turbine blades by UASs with higher-resolution imaging (compared to the traditional method of scaling the masts or using binoculars to conduct inspections) [12]. The real estate industry has begun to take advantage of UASs to conduct aerial surveys and mapping of planned developments or to document transactions [13]. Though not the greatest numbers of exemptions, precision agriculture applications are becoming a valuable tool for farms. UASs are being used to determine whether crops need to be watered and when and where to apply fertilizer in order to increase crop yields and decrease farming expenses [13].

The construction industry is taking advantage of UAS technology as well. Construction companies have primarily been using UASs to provide real-time reconnaissance of their jobsites and to provide high-definition (HD) video and still images for publicity and documentation of progress [16]. These uses are only scratching the surface of the possibilities of UAS applications in the construction industry, and the coming years are sure to see expanding innovations [14].

Today, UAS use is rapidly increasing across many industries as the technological advances have made them both user-friendly and inexpensive [8]. Small multi-propeller helicopters can be equipped with a wide range of sensing

Download English Version:

<https://daneshyari.com/en/article/5026934>

Download Persian Version:

<https://daneshyari.com/article/5026934>

[Daneshyari.com](https://daneshyari.com)