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Importance of Unmanned Aerial Vehicles for Inspection and Investigation of Long Span Bridges

R. K. Jaigopal

csfc@rediffmail.com, csfc@hotmail.com

C.E.O., Concrete Structural Forensic Consultants

#46, 2nd floor, 4th Cross, Sampige Road, Malleshwaram,
Bangalore-560003, Karnataka, India

1 Introduction

Inspection was urgently required for a suspected corrosion in few suspenders of a suspension bridge, where dirt and water easily accumulate which was directly above the sockets and at suspender clamps, the location was inaccessible for gantry, similar was the situation when multiple holes of size 100mm were noticed in RCC pile-pier foundations which needed a close up inspection. There is no other alternate methods other than, inspection through UAV's or drones.

Bridge inspection specific drone technology is advancing and it is being used as effective tool in augmenting high quality data from long span bridges. The drones are used not only for the purpose of inspection but also for investigations. Unmanned aerial vehicles or drones have become part of inspection and investigation of long span bridges whose spans are exceeding 120m. As the span increases the pylons or towers will also increase in their heights leading to further challenges in inspection of bridges. Off-late unmanned aerial vehicles or drones are coming to the rescue of engineers for the purpose of inspection and investigation. The UAV's enable remote extraction of important information of bridge structural health at numerous locations and orientations. 3D modelling of distress conditions, time advanced estimation, can be made and importantly safeguarding safety of bridge inspection engineers. Non-destructive testing using UAV's has become a possibility, hence they are upscaled from inspection to investigation of bridges. UAV's when used along with remote sensing technologies like infrared thermography, visual imaging, lidar and other touch sensors will enable to acquire critical information from structural members in a bridge. In overall ease of use, accuracy, cost effectiveness, data collection tools, simulation platforms, favouring immediate and effective usage of UAV's in bridge inspection and investigations.

2 UAV's for Long Span Bridges

2.1. Long span bridges are very expensive to build, having longer construction periods, they are expected to have life span of upto 200 years, when compared to regular bridges having life span of 70-100 years. Many agencies are working in this direction for enhancing the life span of existing long span bridges to 200 years. As span gets longer, the pylons also become taller to support cables, as such difficulties increase in maintaining the structure. Normally these long span structures are built across straits, where environments are very harsh and hostile degrading the structural elements faster. If preventive maintenance concept is adopted than chances of rehabilitation due to aging can be reduced or even eliminated. Invariably long span bridges are in suspension category followed by cable stayed bridges, extradosed bridges and further other types of long span bridges.