Civil Info

Civil Engineering
News Letter Volume-V Issue-VI April-May (2018-2019)

"WINNER ARE NOT THE PEOPLE WHO NEVER FAIL BUT THE PEOPLE WHO NEVER QUIT "

On its 61st foundation day NEERI has dedicated the first of its kind waste management park to the Nagpur city. Aimed at creating mass awareness about importance of reuse, recycle and segregation of waste, the park itself is an exemplary of best out of waste. Water fountain is created from a waste laboratory sink, a walking bridge built with discarded water pipes, artefacts made from scrapped iron or flower beds made from broken slides and discarded timber. As per the information displayed in the park, an average person generates 500gm to one kg of solid waste daily.

By
B Vijaya Lalitha Asst. Prof.

Cleaner Surfaces and Less Pollution

Mixing active titanium dioxide with cement produces a binder that maintains its entire normal performance characteristic when used to make concrete. The photocatalytic action makes the surfaces not only to a significant self–cleaning; it also improves the quality of surrounding environment. Using titanium dioxide in glass fiber reinforced concrete offers more efficient and economical way to achieve the benefits of photocatalytic. The environmentally active e-GRC offers the most economical way to achieve cleaner, brighter facades.

Applications for the e-GRC include

- Cladding panels and facades elements
- Permanent formwork and form liners
- Roofing tiles
- Motorway and Railway sound barriers

Insulated Concrete Form (ICF)

ICF structural elements allow maximum clear spans. The ICF elements are used for large commercial buildings, residential buildings etc.

Structural Health Monitoring

All structures, including critical civil infrastructure facilities like bridges and highways, deteriorate with time due to various reasons including fatigue failure caused by repetitive traffic loads, effects of environmental conditions, and extreme events such as an earthquake. This requires not just routine or critical-event based inspections (such as an earthquake), but rather a means of continuous monitoring of a structure to provide an assessment of changes as a function of time and an early warning of an unsafe condition using real-time data. Thus, the health monitoring of structures has been a hot research topic of structural engineering in recent years.

Structural health monitoring (SHM)

refers to the process of implementing a damage detection and characterization strategy for engineering structures. Here damage is defined as changes to the material and/or geometric properties of a structural system, including changes to the boundary conditions and system connectivity, which adversely affect the system's performance. The SHM process involves the observation of a system over time using periodically sampled response measurements from an array of sensors (often inertial accelerometers), the extraction of damage-sensitive features from these measurements, and the statistical analysis of these features to determine the current state of system health. For long term SHM, the output of this process is periodically updated information regarding the ability of the structure to perform its intended function in light of the inevitable aging and degradation resulting from operational environments.

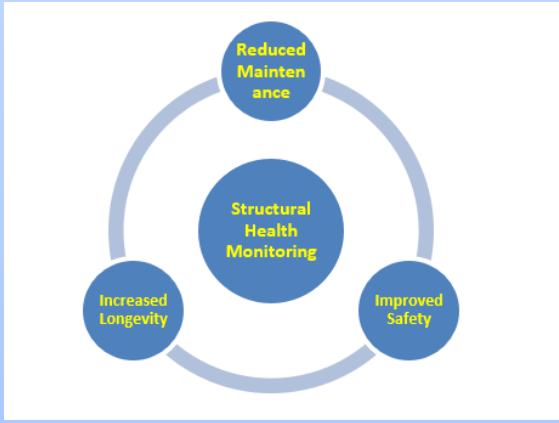

Fig: Application of Structural Health

By
M Vineela Asst.prof.

Unmanned Aerial Vehicle

An **unmanned aerial vehicle** (**UAV**) (or **uncrewed aerial vehicle**, commonly known as a **drone**) is an aircraft without a human pilot on board. UAVs are a component of an unmanned aircraft system (UAS); which include a UAV, a ground-based controller, and a system of communications between the two. The flight of UAVs may operate with various degrees of autonomy: either under remote control by a human operator or autonomously by onboard computers. Their use is to monitor the rapidly expanding commercial, scientific, recreational, agricultural, and other applications, such as policing, peacekeeping, and surveillance, product deliveries, aerial photography, smuggling, and drone racing.

UAV components

Crewed and uncrewed aircraft of the same type generally have recognizably similar physical components. The main exceptions are the cockpit and environmental control system or life support systems. Some UAVs carry payloads (such as a camera) that weigh considerably less than an adult human, and as a result can be considerably smaller. Though they carry heavy payloads, weaponized military UAVs are lighter than their crewed counterparts with comparable armaments.

Small civilian UAVs have no life-critical systems, and can thus be built out of lighter but less sturdy materials and shapes, and can use less robustly tested electronic control systems. For small UAVs, the quadcopter design has become popular, though this layout is rarely used for crewed aircraft. Miniaturization means that less-powerful propulsion technologies can be used that are not feasible for crewed aircraft, such as small electric motors and batteries.

Control systems for UAVs are often different than crewed craft. For remote human control, a camera and video link almost always replace the cockpit windows; radio-transmitted digital commands replace physical cockpit controls. Autopilot software is used on both crewed and uncrewed aircraft, with varying feature sets.

Body

The primary difference for planes is the absence of the cockpit area and its windows. Tailless quadcopters are a common form factor for rotary wing UAVs while tailed mono- and bi-copters are common for crewed platforms

Power supply and platform

Small UAVs mostly use lithium-polymer batteries (Li-Po), while larger vehicles rely on conventional airplane engines. Scale or size of aircraft is not the defining or limiting characteristic of energy supply for a UAV. At present the energy density of Li-Po is far less than gasoline. The record of travel for a UAV (built from balsa wood and mylar skin) across the North Atlantic Ocean is held by a gasoline model airplane or UAV. Manard Hill in "in 2003 when one of his creations flew 1,882 miles across the Atlantic Ocean on less than a gallon of fuel" holds this record. Electric power is used as less work is required for a flight and electric motors are quieter. Also, properly designed, the thrust to weight ratio for an electric or gasoline motor driving a propeller can hover or climb vertically. Botmite airplane is an example of an electric UAV which can climb vertically

Battery elimination circuitry (BEC) is used to centralize power distribution and often harbors a microcontroller unit (MCU). Costlier switching BECs diminish heating on the platform.

Computing

UAV computing capability followed the advances of computing technology, beginning with analog controls and evolving into microcontrollers, then system-on-a-chip (SOC) and single-board computers (SBC). System hardware for small UAVs is often called the flight controller (FC), flight controller board (FCB) or autopilot.

Sensors

Position and movement sensors give information about the aircraft state. Exteroceptive sensors deal with external information like distance measurements, while exproprioceptive ones correlate internal and external states. Non-cooperative sensors are able to detect targets autonomously so they are used for separation assurance and collision avoidance. Degrees of freedom (DOF) refers to both the amount and quality of sensors on-board: 6 DOF implies 3-axis gyroscopes and accelerometers (a typical inertial measurement unit – IMU), 9 DOF refers to an IMU plus a compass, 10 DOF adds a barometer and 11 DOF usually adds a GPS receiver.

Actuators

UAV actuators include digital electronic speed controllers (which control the RPM of the motors) linked to motors/engines and propellers, servomotors (for planes and helicopters mostly), weapons, payload actuators, LEDs and speakers.

Software

UAV software called the flight stack or autopilot. UAVs are real-time systems that require rapid response to changing sensor data. Examples include Raspberry Pis, Beagleboards, etc. shielded with NavIO, PXFMini, etc. or designed from scratch such as Nuttx, preemptive-RT Linux, Xenomai, Orocos-Robot Operating System or DDS-ROS 2.0.

By
Dr.G Vinay Asoc. Prof.

Micro Concrete

Micro Concrete is supplied as a ready to use dry powder which requires only addition of clean water at site to produce a free flowing non shrink repair micro concrete. This is a cementious material, with additives, which impart controlled expansions characteristics in the plastic state while minimizing water demand. This is specially designed for repairs to damaged reinforced concrete elements, particularly where areas is restricted and where vibration of the placed material is difficult or impossible.

Areas of Application

1- Repair to damaged reinforced concrete elements like slabs, beams, columns, wall etc., where access is restricted, and compaction is not possible.
2- For Jacketing of RCC columns to increase load taking capacity (strengthening of a vertical member).

Features and Benefits

1- Can be pumped or poured into restricted locations.
2- Flow able mortar hence does not require compaction.
3- Develop high initial and ultimate final strengths.
4- Offers excellent resistance to moisture ingress.
5- Makes repaired sections highly durable
6- Can be applied at 100 mm thickness at one stroke
7- Contains no chloride admixture.
8- Rapid strength gain to facilitate early reinstatement.
9- Gaseous expansions system compensates for shrinkage and settlement in the plastic state.

Method of Application

1- Clean the surface and remove loose concrete, any dust, oil, paint, grease etc.
2- Expose fully any corroded steel in the repair area and remove all scale and corrosion deposits. Shot blasting is highly recommended
3- Apply Dubond's Hydro Zinc Primer over the clean re-bars and allow dry before continuing.
4- Saturate the substrate with water to prevent absorption of water from the mixed material of Dubond's Micro Concrete
5- For a dry substrate, it should be primed by applying one coat of Dubond's Hydro Prime.
6- Mix Dubond's Micro Concrete with water (3.75 to 4 liters per 25 kg bag) till homogeneous mix is obtained, at 30 C
7- Mixing should be done thoroughly with a forced action mixer of adequate capacity, at least for 5 minutes.
8- Pour or pump the mixed Dubond's Micro Concrete into a watertight shuttering in the repaired area, when primer area becomes tacky.
9- Cure the repaired surface for minimum 7 days.

Precautions and Limitations

1- Micro Concrete can applied in section up to 100 mm deep.
2- For thickness more than 100 mm, addition of pre-calculated aggregates may be required.
3- Ensure that the shuttering is 100 % water tight.
4- Ensure full exposure of reinforcement steel.
5- Consult structural engineer if the diameter of rebar is reduced by more than 20% than original diameter.

By
K Srimukha Asst.Prof.

Skills Needed in a Civil Engineer

Students acquire the required skill sets during their 4-year degree in college. This helps them secure topmost positions in the industry.

Professional skills:

- A sound understanding of social and professional responsibility.
- Effective communication skills.
- Ability to recognize the need of life-long learning.
- Ability to function with diverse teams.

Technical Skills:

- Strong Mathematical skills as well as ability to apply them in Engineering.
- Solution-oriented with ability to analyze and find solutions in different contexts.
- Ability to design projects keeping in mind its societal, financial and environmental impacts.
- Well versed with modern engineering tools and techniques.

The odd semester For all II, III and IV years starts from 10 June 2019. All the best for new semester

EDITORIAL FACULTY
MS. K SRIMUKHA, ASST PROF.

DESIGN TEAM

P.N. UNNATH KUMAR II YEAR
V GIRIDHAR II YEAR

CONTACT
DIETCEHOD@GMAIL.COM