

ASCOM BUILDCON PRIVATE LIMITED



● Inspection ● Testing ● Design ● Strengthening ●



DIRECTOR'S MESSAGE

I am delighted to put-forth few words about the objective of the ASCOM BUILDCON PRIVATE LIMITED.

During the last 40 years of my association with academics and providing consultancy services to large nos. of Government sponsored projects regarding their structural viability, I have noticed that there are a very few organizations which are keen to take up renovation of old and heritage buildings. The approach of these organizations are either cosmetic in nature or of dismantling the structures completely and rebuilt it.

As a consultant, I have always tried to adopt an innovative and cost efficient approach at the time of providing solution of damaged buildings and bridges due to faulty workmanship or substandard materials etc. The S.S. Hospital, B.H.U. structure are as an example of retrofitting work carried out based on the report prepared in my supervision.

I am sure the technical capability and managerial approach of this organization will go a long way in carrying out retrofitting works in future.

I wish a bright future for the company and the old structures which needs retrofitting under the management of this company.

Dr Veerendra Kumar

(FIE, MICI, MISTE, FIGS, MIBC)

Ex-Professor, Civil Engineering.

IIT (BHU) Varanasi



OUR PROFILE

Renaissance of structures is the basal of the founding the ASCOM. This company is a confluence of a IIT Kanpur alumnus of 1974 batch who is a legendary structural engineer with approx. 38 year of teaching experience to the best talent of country, with a young, dynamic and swingeing field Engineer carrying doctoral degree in retrofitting and strengthening of damaged structures.

Veerendra Kumar, a veteran ex-professor of IIT Varanasi and an illustrious structural engineer founded an organisation collaborating with a very fresh talent and splendid structural scholar Dr. Anjani Kumar Shukla who completed his Ph.D. in Rehabilitation of damage structure from IIT Varanasi and worked in Multinational Companies (MNCs) on several important projects.

ASCOM continuously focusing on “Building the trust” by providing consultancy for repairs, rehabilitation and retrofitting of damage structures. Seeing the current growth and revamping of the entire Indian infrastructure market, which includes Railways, Airports, Roads, Bridges, Hydro Power Plants, Residential and Commercial high-rise towers, the company has started its consultancy office from very ancient city VARANASI, Uttar Pradesh, which is full of antique structures in and around city and have a business relationship with various national and international organizations. In response to the Innovative and high quality solutions, ASCOM, has been called upon to solve some of the most challenging structural problems of the old and damage structures of Varanasi and surrounding cities. Company is actively involved in structural Audit and health monitoring of bridges and buildings along with providing the solution for repair and strengthening of important damaged structures. ASCOM aims to innovate with new testing methods and make existing instrumentation more friendly and accurate by doing in-situ and laboratory Research work.



ASCOM SERVICES



ASCOM performs with the best and latest technology available in the market and always gives One-stop solutions to its customers.

- a. Health assessment and monitoring of structure using advance sensors.
- b. All type of bridge bearings
- c. Expansion joint
- d. Destructive and non-destructive testing (NDT) using modern instruments. (such as ultrasonic pulse velocity (UPV), ferrous scanner, half-cell potentiometer, carbonation, rebound hammer, CAPO Test, Core cutting etc.)
- e. Investigation and precise Auditing of structure
- f. Consultation and Approval.
- g. Design of all type of structures

Design: ASCOM provide the structural design of all type of buildings, water tank and river crossing foundation for transmission line towers, STP etc. We have highly qualified and competent team of structure designers and consultant from several IITs and NITs.

Auditing: ASCOM as a team will be carrying out all the necessary tests required to access on site Properties of materials, capacity assessment of structural members or structure as a whole.

Testing and SHM: With all the advanced sensors company is fully equipped for structural health monitoring of all type of structures.

Consultation: ASCOM gives a unique approach to every individual project. The diagnosed problem is discussed between the team of auditing, design, execution and associates from well-known Organization to come up with suitable solution. The proposed design will be approved by associates in well – known organizations like IITs, NITs, Research sectors etc.

Bearing and expansion joint: - ASCOM install and replace all type of bearings and expansion joints used in different type of bridges.

SERVICES WE OFFER



TESTING OF STRUCTURES

Rebound Hammer Test (IS 13311 Part 2)



Rebound hammer test method is based on the principle that the rebound of an elastic mass depends on the hardness of the concrete surface against which the mass strikes." In other words, the amount of rebound recorded using the hammer will depend on the hardness of the concrete surface, which will then correlate to the compressive strength of the concrete.

Ultrasonic pulse velocity (IS 13311 Part 1)



An ultrasonic pulse velocity (UPV) test is an In-situ, non- destructive test to check the Quality of concrete. In this test, the strength and quality of concrete is assessed by measuring the velocity of an ultrasonic pulse passing through a concrete structure. The high UPV Test and lower time of travel indicate good quality of concrete in terms of density, uniformity, homogeneity, etc.

Half Cell Potential Test (ASTM C876-91)



The half-cell potential is the potential developed at the electrode of a half cell due to the process of oxidation or reduction. This potential is used to indicate corrosion activity, and measures the tendency of one reaction, like oxidation, to proceed at its one half-cell electrode and similarly measures the corresponding tendency for reduction to proceed at the other half-cell electrode. The corrosion activity of the reinforcing steel.

Carbonation Test (BS 1881 Part 201)



Carbonation of concrete is a process by which Carbon di Oxide from the air penetrates into the concrete and reacts with calcium hydroxide to form calcium carbonates. Conversion of Ca(OH)_2 into CaCO_3 by action of CO_2 by itself is not reactive. In the presence of moisture, CO_2 changes into dilute carbonic acid which attacks the reinforcement and also reduces alkalinity of concrete. In this test Phenolphthalein solution is used as indicator.

Rebar Mapping:



Rebar mapping surveys can determine rebar distribution (spacing and depth of the different rebar layers), rebar cover thickness, overall concrete slab thickness, and detect any other features within concrete including post tension cables, conduits, ducts, and voids.

SERVICES WE OFFER



TESTING OF STRUCTURES

Core Testing (IS 516)



Core tests involve taking the actual core Samples from the structure using the diamond core cutting bits and subjecting the cores to compressive loading in the compression testing machines, followed by the visual inspection. Core tests are conducted in conformance with the guidelines laid out in IS: 456.

Pull off Test



The test measures the force required to pull out a previously cast in steel insert with an embedded enlarged end in the concrete. In this operation, a cone of concrete is pulled out and the force required is related to the compressive strength of concrete. This test method is used to determine. 1) Bond strength of a repair or an overlay Material to the substrate. 2) The tensile Strength of a repair or overlay material, or an adhesive used in repairs, after the material has been applied to a surface.

Slab and Beam load Testing (IS 456 :2000)



The strength evaluation of structural member of RC structure is of prime Importance. One such method for strength evaluation of flexural member (beam and slab) of RC structure is physical load test. Linear potentiometers are placed below the slab and beams and the graphs for deflection are recorded as per the gradual Increase in the loading.

Capo Test (ASTM C 900)



The Cut and Pull Out (CAPO) is a reliable test method to determine the in-situ compressive strength of concrete. The groove is recessed through the centre hole by a diamond tool with a similar shape as a dentist's drill, larger at the tip than at the base. The CAPO test results are found to be within 8-10% of the results obtained from conventional methods. The CAPO tests determines the compressive strength of in-situ concrete in various structures like concrete roads, bridges, buildings etc.

STRUCTURAL HEALTH MONITORING OF BRIDGES

Deflection Measurement



Linear potentiometers are used to measure the Deflection of the Girder during load testing of The Bridge. The sensors should be placed as per The Design to achieve the maximum deflection. Linear Potentiometer works on the principle of Variation of mutual inductance. Linear Potentiometer changes mechanical linear moves into electrical signals.

Natural Frequency Measurement



An accelerometer is an electromechanical device Used to measure acceleration forces. Quantitatively, natural period of vibration can be obtained from signal recorded by proposed data acquisition system. Then, results from proposed system are compared with those obtained from common accelerometers. Since piezoelectric sensor emits a signal when a change in the stress condition occurs, the sensor was setup at the support of the bridge where large changes in the stress level is expected to occur. The target bridge was also subjected to moving loads, and its vibration response was also obtained. The experiment will be performed using a track of designed weight. Responses were captured appropriately using the proposed system and they are comparable with responses obtained from accelerometers.

Strain Measurement



Strain Gauges are an important geotechnical tool that measure strain in underground cavities, Tunnels, Buildings, concrete, masonry dams, Bridges, Embedment in soil/concrete. Etc. The main Purpose Of a strain gauge is to indirectly determine Stress and its variation with time, quantitatively. Change in Stress is determined by multiplying the Measured Strain by the modulus of elasticity.

Crack Width Sensors



Omega width sensors are in great use to find If there is any widening in the crack during the Load testing of the bridge. Customized wireless sensor networks platforms are used by ASCOM and implemented with sensors especially for crack monitoring, which include crack metres and temperature detectors. Software protocols like route discovery, time synchronization and data transfer are developed to satisfy the requirements of the monitoring system and stay simple at the same time.

STRUCTURAL HEALTH MONITORING OF BRIDGES

Displacement of Bearings



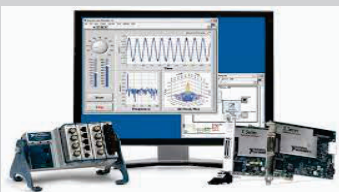
Linear potentiometers are installed in Longitudinal and Lateral directions and the Displacement of bearings is measured during dynamic testing of the vehicles.

Inclination of Girders



Digital Inclinometer is placed in order to Measure the inclination of the girders. Inclinometers, also called tilt sensor, Clinometers or slope sensors, are designed to measure the angle of an object with Respect to the force of gravity.

National Instrument Data Acquisition System



The National Instruments 9237 simultaneous Bridge module contains all the signal Conditioning required to power and Measure up to four bridge-based sensors simultaneously. The four RJ50 jacks provide direct connectivity to most torque or load Cells and offer custom cable solutions with Minimal tools. The high sampling rate and Bandwidth of the NI 9237 offer a high-Quality, high-speed strain or load Measurement system with zero Inter channel phase delay.

WIRELESS SENSORS



AVAILABLE Wireless Sensors

Sensors that are Wireless, Durable, Reliable and have battery life of 10 years



Battery Life

The sensors have a battery life of **10 years** without replacement



Working Temperature

Sensors can survive temperature between **-40 to +65°C**



Precision

Sensors with strain precision of **1 µε** and tilt **0.00013°**



Easy Installation

Self-Adhesive or bracket mounted sensors



Wireless Transmission

Sensors transmit data up to a free space of **1000 m**

Wireless Strain Gauges



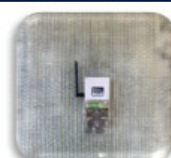
- Maintenance free, low-power: minimum battery life of 10 years
- Wireless communication, Small size and lightweight
- Quick installation, self-adhesive/flange Working temperature: -40 to +65°C

Wireless Displacement Gauges



- Wireless transmitter: 120 g, Cable (1ft): 10, Displacement sensing element: 100 g.
- High accuracy: 0.1mm resolution
- Measurement Range: 25mm, 50mm, 75mm, 100mm, 300mm

Wireless Inclinator



- Narrow Range: $\pm 0.0003^\circ$ or Regular tilt : 0.1°
- Flange-mount or adhesive tape, Lightweight: 180 g.
- No wiring is required for data collection, Ingress Protection: IP65, weatherproof
- lithium ion battery

Wireless Accelerometer



- Self-Adhesive, Flange Mounted, no wires for data collection,
- Sampling Rate-1-100 sec, Shock Survival 1000g (for 0.1 sec), Full Range $\pm 2g$, Resolution $10\mu g$,
- Battery life before recharge -10 years,
- IP65 weatherproof Protection.

Wireless Anemometer



- Energy self sufficient: solar powered Small size: small, easy to install
- Weatherproof: IP66 protection
- Wind speed: Range: 0 to 75m/s (0 to 156mph), Resolution: 0.01m/s, Accuracy - 2% or 0.1m/s (0 to 30m/s).

Wireless Ultra-Sonic Level Meter



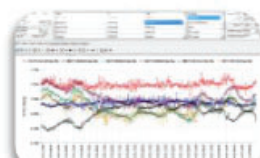
- Energy self sufficient: solar powered Small size: small, easy to install
- Weatherproof: IP66 protection
- High accuracy - Max range: 9.1m (30 ft), Resolution : 3 cm.
- Wide working temperature: -40 to +65-C

Wireless Data Logger



Energy self sufficient: solar powered Small size: small, easy to install
Weatherproof: IP66 protection
Lightweight: 1.5Kg (3.0 lb)
Logger offers optional connectivity in areas with no cellular or cable coverage.

Data Interpretation



- Secure internet-based interface
- Visualizing Data
- Data Filter analysis
- Alert Generation
- Report Automation

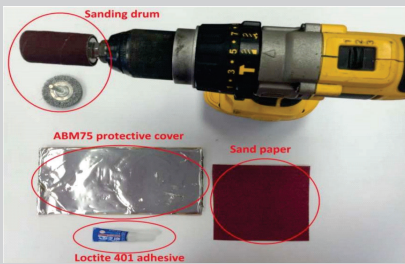
WIRELESS SENSORS



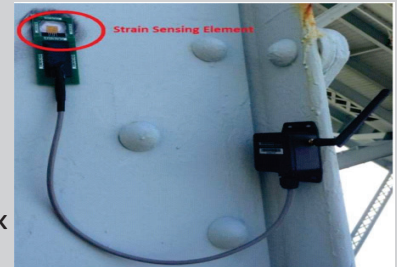
Installation of Wireless Strain Sensors

Simple procedure and can be done in a few minutes

Required tools for installation are as follows;



1. A coarse sand paper (grit size around 80) or a sanding drum and drill
2. Cold Cure Adhesive such as LOCTITE 401 from Omega Engineering
3. Wiping tissue
4. ABM75 Strain Gauge Protective Cover Box
5. Strain Sensor



Typically, cold cured adhesive and ABM75 protective cover are provided by NOVISS to the customer along with Strain Sensor. Other items such as sanding drum and drill or sand paper and wiping tissues can be purchased from any local hardware store.

1. Preparing the Surface



Sand the installation spot using a sand paper. It is much easier to do this by a drill and sanding drum (the same as picture). Any rust, paint and oxidized layer must be removed from the steel surface and the bare steel must be appeared. Make sure the size of bared steel area is large enough to contain the whole strain gauge inside.

2. Cleaning the Surface



Use the wiping tissue to remove the produced dust by the sandpaper

3. Remove Adhesive Cover of Receiver



Peel off the adhesive cover at the back of the wireless transceiver. A sharp tool such as tweezers may be used to make peeling easier.

4. Install Trans-Receiver



Place the wireless transceiver on prepared spot and push it for around 10 to 15 seconds to ensure that the attachment is strong and secured.

5. Applying Adhesive



Apply one drop of "Cold Cure Adhesive" such as Loctite 401 to the scratched spot.

6. Peel of Adhesive Cover of Sensor



Peel off the adhesive cover at the bottom of the sensing element. A sharp tool such as tweezers may be used to make peeling easier.

7. Hold the Sensor at Sensing Location



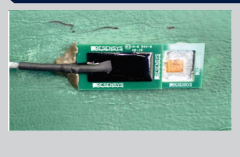
Hold the sensing element above the prepared area and adjust its location so that the strain gauge aligned with the scratched spot. Then put the sensing element on the metal and apply some force to attach the body of the sensor first. Between 10 to 15 second is enough to secure a strong connection

8. Apply Pressure on Sensor



Keep pushing with finger against the steel substrate for around 2 to 3 minutes

9. Protection with ABM 75



Tuck a bit of ABM 75 to the tail of the probe with flat tools like a screw driver.

10. Protection against Moisture Ingress



Attach the adhesive side of cover to sensing element. Align the cover with sensing element and make sure it covers the entire sensing element. Press the cover firmly so that it tightly attached to sensing element. Other side of the cover is adhered to an aluminum sheet. This aluminum sheet protects the cover and sensing element from UV and overheating.

11(a). Final Surface Installed Sensor



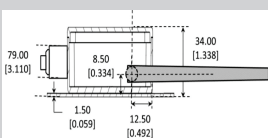
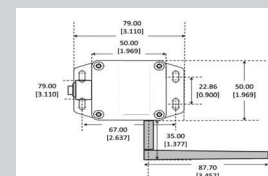
Clean the aluminum surface of protective cover. The final steel strain gauge attached to the steel bridge is shown in the picture.

11(b). Final Embedded Strain Sensor

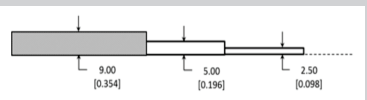
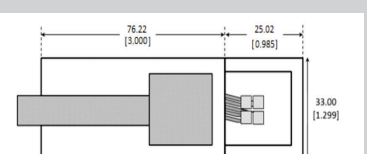


If the strain sensor is to be embedded in concrete, the foil strain gauges is to be pasted to the reinforcement before casting. The cables and receiver nodes are carefully taken out of the formwork. After casting, the nodes are attached to a bracket which is bolted to concrete.

Sensor Dimensions and Specifications



Property	Specification
Mounting	Surface mounted / Embedded
Accuracy	Upti 1 microstrain
Triggering Threshold for alarm/text generation	adjustable from 16 μ Strain to 512 μ Strain;
Sampling	25 ms / Reading
Operating Temp	-40°C to +65°C
Comm.	Wireless RF unlicensed 2.4Ghz band



LEADERS



Dr. Veerendra Kumar ***Director***



After competing JEE, joined Department of Civil Engineering at IIT Kanpur in 1974 and passed out with flying colors in 1979. In spite of having offers from industry, preferred to continue higher studies at his Alma mater and did post-graduation in Structural Engineering in 1981. To have on-hand experience about practical problems in industry, joined Steel Authority of India Ltd. at Bokaro. The exposure at SAIL, Bokaro, highlighted structural issues of running a plant in dynamic state involving health status of steel structures. Devised solutions leading to retrofitting/strengthening of structures which is still continuing at Bokaro. To have deeper knowledge about steel structures preferred to continue his forage and joined as a teacher at I.T. B.H.U. in 1984. He obtained his Ph.D. in the Year 1987 from IIT Kanpur. He was associated with most prestigious work of present government, related to development of Varanasi as cultural capital, as structural consultant to Kashi Vishwanath Corridor and retrofitting of old Ghats. In addition, designed large nos. of high rise buildings and prepared scheme for retrofitting of several heritage buildings and also, buildings damaged due to improper maintenance. During his academic carrier, had been consultant to several Universities involving renovation of old buildings. His academic carrier can be summed up by highlighting his more than 100 publications related to plastic analysis of structures. He supervised more than hundred post-graduates and several Ph.D. students.

Dr. Anjani Kumar Shukla ***Managing Director***



Dr. Anjani Kumar Shukla, an alumnus of IIT(BHU) Varanasi, is the managing director and founding member of ASCOM BUILDCON. He born and brought up in the holy city Varanasi, and completed his primary education there. After completing graduation in Civil engineering, he joined a multinational construction company in Hyderabad, and worked in a National Highway project. Very soon he stepped forward for higher studies and completed his masters in Structural Engineering. After M. Tech. he joined teaching as assistant professor in a reputed engineering college and continued for two and half years. During his teaching assignment he was mentor and organiser of several STC in collaboration with several IITs like IIT Kharagpur, IIT Bombay etc. His interest in bridges and buildings drags him into research program in one of prestigious institute of India- I.I.T. (BHU) Varanasi. During his research Dr Anjani attended many International and national conferences organised by different IITs, NIT and other universities and presented several papers. He did his research work on his topic of interest i.e., Retrofitting of damaged structures and their performance after repair. He published dozens of research papers in reputed international journal related to his work. Dr Shukla also writes for a technical magazine CECR (Civil Engineering and construction review). He was associated with Mumbai based strengthening and Construction Company for almost a year as Vice President and successfully completed auditing, testing and retrofitting of several government and non-government structures.



• Inspection • Testing • Design • Strengthening •

Audit



Testing



Strengthening

