Journal of Advances and Scholarly Researches in Allied Education
Vol. XV, Issue No. 2, (Special Issue) April-2018, ISSN 2230-7540

Structural Health Monitoring

Prasad Ghodake[1]* S. R. Suryawanshi[2]

[1] PG Research Scholar, Civil Engineering Department, JSPM, s ICOER, Wagholi, Pune, Maharashtra, India

[2] Assistant Professor, Civil Engineering Department, JSPM's ICOER, Wagholi, Pune, Maharashtra, India

Abstract – ***The view in the direction of actualizing a damage identification and portrayal technique or method for engineering building is known as structural health monitoring. Here damage is characterized as changes to the material and additionally geometric character of a basic platform including changes to the limit conditions and framework availability, which unfavorably influence the framework's execution. The SHM procedure includes the examination of a model structure over a time utilizing intermittently examined dynamic response taken from a variation of sensors the subtraction of harm delicate highlights from this examination, and the factual investigation of these highlights to determine the present current state of system health. For long carry SHM, the yield of this procedure is periodically refreshed data according to capacity of the structure to play out its prepared capacity in light of the unavoidable maturing and debasement coming about because of operational situations. After extraordinary occasions, for example, tremors or impact stacking, SHM is utilized for quick condition screening and means to give, in close constant, solid data with respect to the respectability of the structure***

Keyword: Damage Identification, Geometric Character, Framework Availability, Dynamic Response, Yield.

----------X----------

I. INTRODUCTION

Statement of structural behavior is a really old discipline that has accompanied theoretical improvements in structural mechanics since its origins (Benvenuto 1991), giving fundamental information of physical phenomena and confirmation of computational procedures. On the additional view, in last 20 year this statement has additionally taken dissimilar characters, little by little becoming the basic tool for facing the time-dependent safety problem invented in 1993 by Mori and Elling wood.

Structural health monitoring was introduced from a simple experimental observation, now it has been influenced by two features on the additional view via the significances led by way of degradation of current creation resources and functional obsolescence onto infrastructure economics and, one the other sideways of the hand, by the provision of cheap, powerful and sturdy modern instrumentation and hardware/software tools to perform structure data attainment and indicate processing functions. Structural health monitoring (SHM) is just blend of traditional experimental/ theoretical knowledge such as structural mechanics, electronics, material technology Making use of this discipline can business lead to the meaning of monitored structures Packages of this area can result in the description of monitored structures, a category of systems the characteristics of which in phrases of protection and reliability indices have to be considered in another way from traditional systems, in which protection is based on passive resistance most effective, in direction to derive precise included layout methods (Del Grosso 2008). Further, the integration of tracking machine standards in structural layout is a critical step in innovative structural engineering, paving the approach to the development of clever adaptive structural structures.

II. LITERATURE REVIEW

Andrea E. Del Grosso1 [1]: Structural Health Monitoring: research and practice

The thesis is marked at rereading the lead research realizations on the issue (SHM) and to dispute about the reasons because practical presentations still encounter Difficulties in becoming a standard practice in civil engineering

AYAZ MAHMOOD [2]: SHM USING

NON DESTRUCTIVE TESTING OF CONCRETE

This paper Structures are get-togethers of load carrying members capable of securely reassigning the lay over loads to the base and Non-Destructive Evaluation (NDE) techniques, are being used for SHM.

JEONG-TAEKIMET [3]: RECENT RESEARCH TRENDS AND ACTIVITIES ON STRUCTURAL HEALTH MONITORING (SHM)

In this thesis, current research developments and actions on (SHM) of civil infrastructure in Korea are reviewed. Recently, there has been growing need for approving smart sensing

GYUHAE PARK [4], HOON SOHN, CHARLES R. FARRAR, DANIEL J. INMAN: Overview of Piezoelectric Impedance-Based Health Monitoring and Path Forward

In this paper we review the hardware and software issues of impedance-based structural health monitoring based on piezoelectric materials**.**

BHALLA SURESH [5]: Application of structural health technology in Asia: this paper content various SHM application on various structure over Asia

AKIRA NISHITANI [6]: STRUCTURAL HEALTH MONITORING METHODOLOGY

This thesis offerings an exclusive two-stage-based procedure of spotting how the reduction in story stiffness of a damaged or old building is

III. METHODOLOGY

In the methodology of SHM have two stages.

The target of first stage is to determine whether the damage exists or not anddiscover its location if the damage. In this stage, the structure modal is approximated with the proper orthogonal decomposition (POD) this technique is effectively applied to find the structure modal based on total acceleration response data.

The objective of the subsequent stage of the proposed methodology is to quantify the damage state and placement in this stage, system recognition the damage of structure model.

The proposed methodology contains of the following procedures in simple word.

- Investigation of damage presence
- Investigation of damage position
- Quantification of damage severity
- Estimate of left over life of the structure

3.1 Shm Procedure Using Non Destructive (Ndt) Method:

NDT technique can be functional for determining and computing the real state of the structure model these kinds of technique are comparatively quick, stress-free to use and economical and normally it uses characteristics of the material .this method is minimizing the period of structure and invested money. This NDT method be contingent upon the characteristics of the material.

The consequent testing of structure will largely rest upon the result of first testing done with the proper NDT technique. Now days The NDT relatively fast, easy to handle and economic may be used for

I. Read-through the any wide-ranging variety of topics and spaces

II. Judging the structure for various troubled situations

III. Judging destruction because of fire, chemical assault, impact, age and a lot of others

IV. Spotting cracks, voids, fractures, honeycombs and weak spaces

V. Judging the actual state of affairs of reinforcement

3.2 Diversity of Ndt Process

3.2.1 Strength Assessment of Concrete

I. Rebound hammer test

II. Ultrasonic Pulse Velocity Tester

III. Mutual use of Ultrasonic Pulse Velocity tester and rebound hammer test

IV. Pull off test

V. Break off test

3.3 Shm in Practice

3.3.1 Static Grounded SHM

Based on the statement that defect can modify the static behavior of the structure.

DRAWBACK:

Significant static sway wants great treaty of static force

Vibration-Based SHM

Based on the statement that defect can modify the dynamic characteristics of the structure model

IV. NDT METHOD LIMITATION

Technique	Capabilities	Limitations
Visual examination	Visual examination	Small errors are hard to identify
Microscopy	Small surface errors	Smallest defect detectable is 2% of the thickness; radiation protection. No subsurface flaws not for porous materials
Dye penetrate	Surface faults	No subsurface faults not for porous materials
Ultrasonic	Subsurface faults	Material must be good conductor of sound.
Eddy Current	Surface and near surface flaws	Difficult to interpret in some applications; only for metals.
Peizo-electric effect	Surface and near surface flaws	Difficult to interpret in some applications; only for metals

V. BENEFITS:

The observing and repairs of structural model it always being measured to be crucial, but it's necessary for structural fitness. Today, new technological progresses and procedures are being developed as part of a process now mentioned to as (SHM)

Following are the advantage

i. Increased Safety:-

Superior hard work to improve SHM ultimately works to advance total public security. These efforts contain everything from new plans and guidelines that help ensure structural safety, to the enlargement of new technologies that make succeeding safety simple

ii. Distinguishing Early Safety Risks:

In accumulation to serving engineers identify weaker structural situations and other security point's advances in SHM also help professionals evaluate possible upcoming risks to safety. This has been particularly useful in stopping water and flood destruction caused by failed dams, dykes, pipelines, and other parallelconstructions

iii. Longer Life Durations:

Carrying outregular defensive andurgentrepairs on infrastructures helps growth their durability. Numerousskills and new attitudes using SHM give engineers the tools to build and continuelong-lasting structures like not ever before. Set upcorrect sensing technology not only deliverssuperiorfacts about structural health, but also helps justification for human mistake.

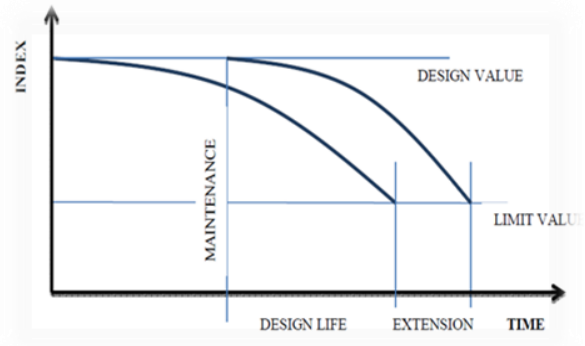

Fig 1-

iv. Cost Competence:

For improving safety and confirming extended life spans for structures, SHM can also significantly decrease costs associated to structural maintenance. Of course, reduced costs are characteristic in developed security procedures that decrease the risk of structural and environmental damage

VI. CANCLUSION

The SHM has various method for detecting the damage type and its location also, it has various advantages and they are varies with method but, it has some limitation also, but over view all SHM has great scope ahead not because of it related to structural business but it related to preservation of our structural life.

As we discuss above all content we see that SHM useful for structural

VII. REFERENCES

Akira Nishitani (2013). **"**Structural health monitoring methodology"

Andrea E. Del Grosso (*2013*). *"Structural Health Monitoring: research and practice" (September 2013)*

Ayaz Mahmoud *(2008).* "*SHM using Non-destructive testing of concrete"*

Bhalla Suresh (2008). "Application of structural health technology in Asia**"**

Guyed park, hoon sohn, Charles R. Farrar, Daniel j. Inman (2008). **"***Overview of Piezoelectric Impedance-Based Health Monitoring and Path Forward*"

Jeong-taekimet, (2008). **"***Recent research trends and activities on structural health monitoring (shm)*" (*March 2008*)

Corresponding Author

Prasad Ghodake*

PG research scholar, civil engineering department, JSPM, s ICOER, wagholi, Pune, Maharashtra, India

E-Mail – **prasadghodake923@gmail.com**