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A REVIEW ON BEHAVIOUR OF SLAB PANEL UNDER DYNAMIC LOAD

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Abstract —*These Textile industries were developed during the historical era in India. Surat, is were known for its textile Industries and weaving technology. Previously this looms were installed in the residential areas such as buildings, etc. there was no special foundation designed. These machines were directly rested on the floor slab. The major cause which was established with the heap of this machine is "VIBRATION". Therefore, the parametric study of the structure will be carried out with comparison of different structural parameters and retrofitting aspect. Conclusion will be carried out on reduction of vibration effect due to operation of looms machine*.

Keywords-*Textile, Looms, Foundation, Vibration, Structural Parameters, Retrofitting Aspect*

I. INTRODUCTION

The Indian textile industry has a great legacy, which is perhaps unmatched in the history of India's industrial development. India's textile industry evolved and developed at a very early stage and its manufacturing technology was amongst the best. Prior to colonization, India's manually operated textile machines were among the best in the world, and served as a model for production of the first textile machines in newly industrialized Britain and Germany. An apparatus which is hand operated or power driven for weaving fabrics, which contains harnesses, lay, reed, shuttles, treadle etc is called Looms. The basic purpose of it is to wrap threads under the tension to facilitate the interweaving of the weft threads.

The modern looms machines have transformed the entire scenario of Textile production. It enables easy and faster production rate of textile manufacturing. These machines have proved to be a boon to Textile manufacturers in terms of economy and time. However, they come with an unseen drawback of "Vibrations" due to their high operating speed. The parameters normally used to assess the vibration are the amplitude and frequency. In order to completely define a vibration, the amplitude and frequency of motion are measured in three orthogonal directions, generally in terms of displacement which is considered to be the best description for assessing the potential damage response of a structure. These vibrations may cause varying degree of damage to the building components. Minor damage is seen in the building to non-structural components such as cracking of masonry walls, de-bonding of aggregate and cements gel, etc. However, if the amplitude of vibration increases, it may cause serious damage to structural components such as excessive deformation of beams, columns, fatigue failure and settlements; which may cause serious damage to life and property.[6]

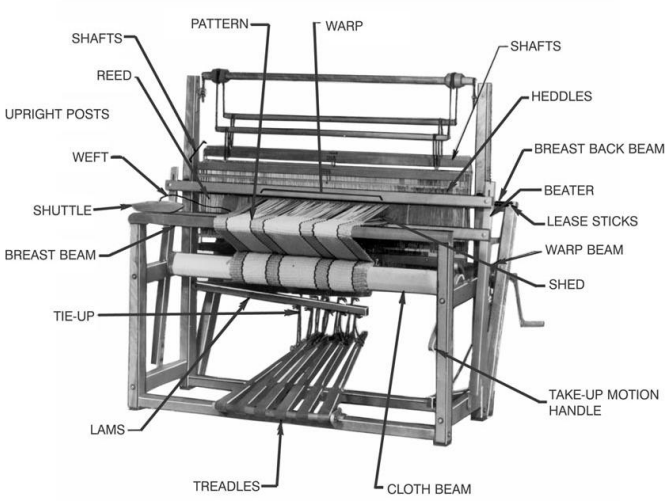

Figure 1. Looms machine

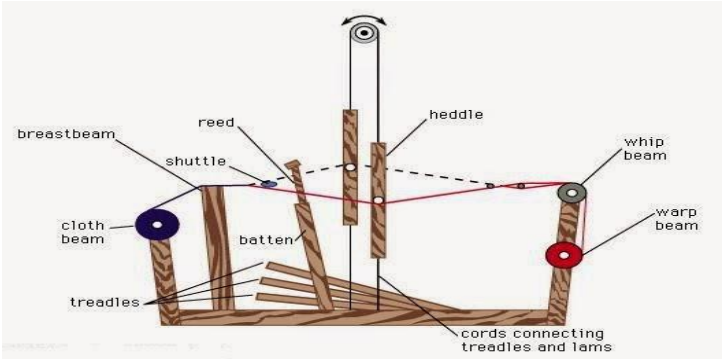

Figure 2. Basic components of looms machine

II. LITERATURE REVIEW

A. Study On Remedial Measures To Control Machine Induced Vibration Of Factory Building; International Journal Of Engineering And Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-2, Issue-4, April 2013

Gaurang A. Parmar, Yogesh D. Rathod, Sunil H. Kukadiya, Sarthi B. Bhavsar, Jigar K. Sevalia; "Study On Remedial Measures To Control Machine Induced Vibration Of Factory Building**".** This paper aims that a comprehensive understanding of structural dynamics is essential to the design and development of new structures, and to solving the vibration problems on existing structures. A broad range of complex vibration problems can occur in the Looms Industry. A successful analysis and resolution of machine vibration problem requires a thorough understanding of the equipment, and the ability to apply various diagnostic techniques. Due to heavy machine operations the building is subjected to vibration effect. This paper aims at understanding the behavior of Looms factory building, subjected to dynamic loading and provision of certain remedies to such buildings which can overcome resonance condition.
A specific methodology was employed by them during the study and the proper field work was carried out. With the help of that data, basic models of the structures were developed on the STAAD Pro software. Two specific models of strong beam - weak column and strong column -weak beam under resonance condition are taken for beam size 230 mm x 685 mm and column size 230 mm x 460 mm and vice versa. Several structural remedial measures are considered on these models like cross-bracing below plinth level, full length jacketing of columns, partial Jacketing of Column above plinth level, cross tie-beam, haunches. Results are obtained and graphs are plotted showing the nature of frequency and displacement of the building with respect to structural remedies. A comparative study is extended showing the most effective remedy for the sustenance of the building subjected to vibration.

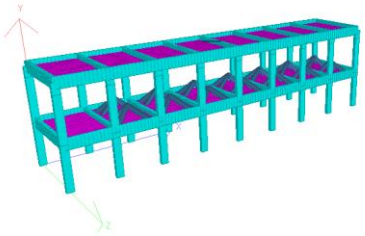

Figure 3. Original building without remedial measures

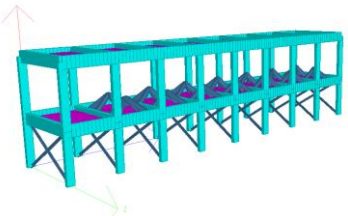

Figure 4. Cross-Bracing below plinth level

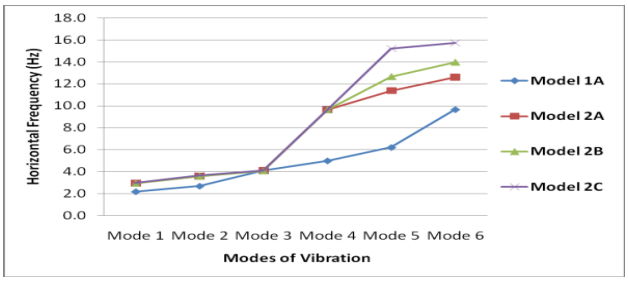

Figure5. Horizontal Frequency Vs. Mode Shapes for model types 1 and 2

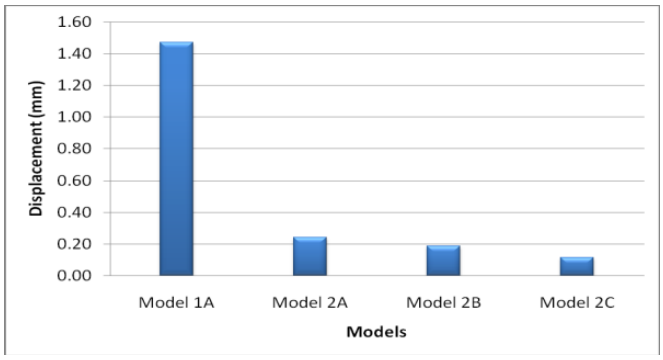

Figure 6. Comparison of Horizontal Displacement for model type 1 and 2

At the end authors concluded with effects of provision of various structural remedies on reduction of vibration effect in the structure by comparing various models and by values generated from the graphs.

B. Behavior Study Of Industrial Building Under Dynamic Load; International Journal Of Current Engineering And Technology E-ISSN 2277 – 4106, P-ISSN 2347 - 5161 ,Volume-4, No-2, April 2014

Jigar K. Sevalia, Ruchika S. Patel, Neel H. Shah, Akshay S. Agrawal And NehaModi;"Behavior Study Of Industrial Building Under Dynamic Load".The purpose of this research work is to study and understand the behavior of composite structural system (i.e. combination of load bearing and framed structural system) subjected to vibration of reciprocating type machines like looms. In the study Preparation of drawing of typical industrial floor plan showing layout of machine position on the industrial floors of existing building, section and elevation, using CAD software.Modeling of building frame structure using structural engineering software – STAAD.Pro. Its pre-analysis includes modeling, labeling, assigning geometric properties and loads to various structural components, as well as to assign support conditions and to assign suitable analysis commands.

The post-analysis includes studying of various modes shapes and their respective frequencies and amplitude, plotting of the graphs of various results of mode shapes, frequency and displacements with respect to various sizes of beams and columns.

The plan of the loom industry is shown in Fig 7. By using the STAAD.Pro. Software, the dynamic analysis of the loom industry is carried out. An attempt of parametric study is made in this paper.

To study the dynamic behavior of the structure subjected to harmonic loading due to machine operation,sixty four different models have been developed in this parametric study. These models are made by varying the beam size, column size, and storey height and wall thickness.Various sizes of these components are listed in Table 1.

Table 3.1: Different sizes of components considered for study

Various Parameters	**Sizes**
Beam Size (mm x mm)	230x460, 230x525, 230x600, 230x675
Column Size (mm x mm)	230x460, 230x525, 230x600, 230x675
Storey Height (m)	3.2 , 3.6 , 4 and 4.4
Wall Thickness (m)	0.23, 0.39, 0.45 and 0.61

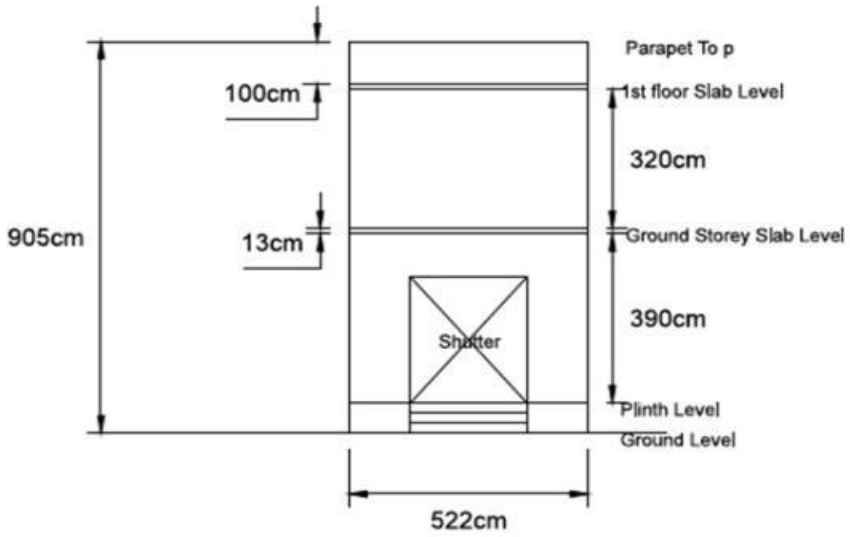

Figure 7. Front elevation of loom industry

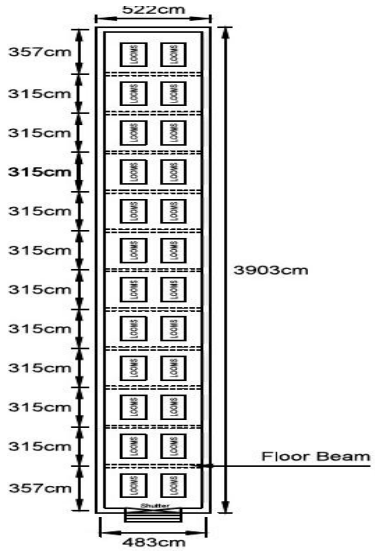

Figure 8. Typical floor plan

The results are obtained for various parameters like the different beam size, column size, and storey height and wall thickness. The graphs obtained from these results are given below For Beam Size 230 mm x 460 mm and Wall Thickness 0.23 m) as shown in below figures.

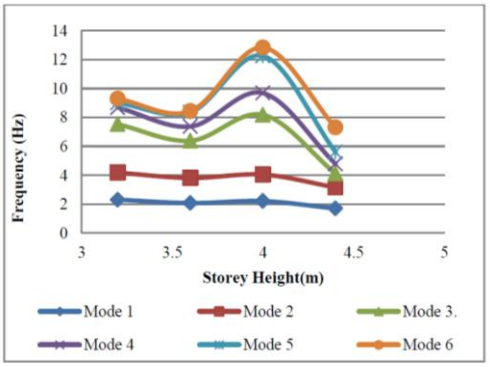

Figure 9. Effects of column size and storey height on horizontal frequency in X-direction (for beam size 230mmx460mm, column size 230mmx460mm and wall thickness 0.23m)

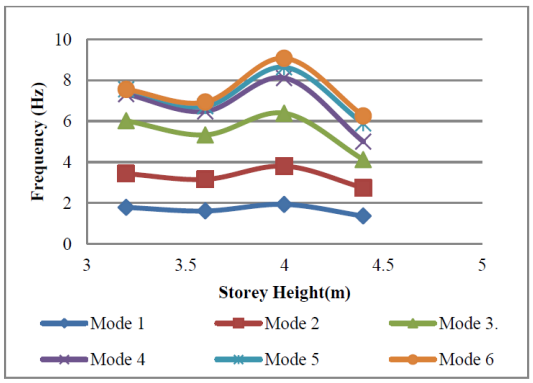

Figure 10. Effects of column size and storey height on horizontal frequency in X-direction (for beam size 230mmx460mm, column size 230mmx525mm and wall thickness 0.23m)

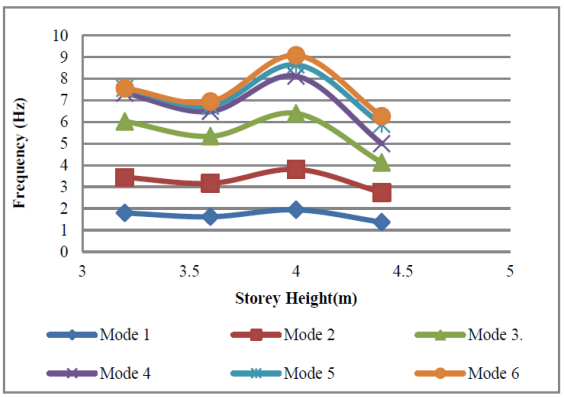

Figure 11. Effects of column size and storey height on horizontal frequency in X-direction (for beam size 230mmx460mm, column size 230mmx600mm and wall thickness 0.23m)

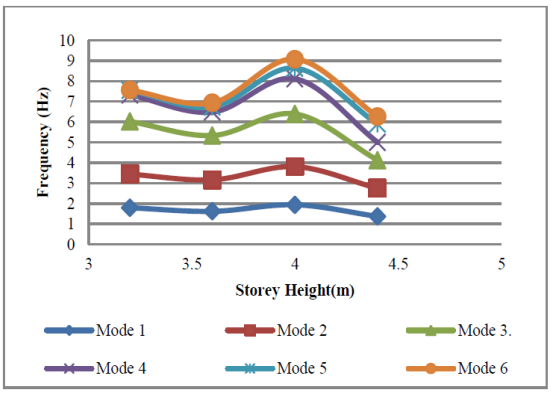

Figure 12. Effects of column size and storey height on horizontal frequency in X-direction (for beam size 230mmx460mm, column size 230mmx675mm and wall thickness 0.23m)

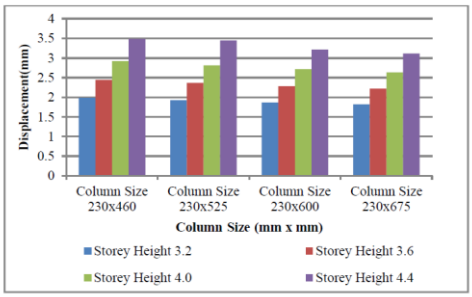

Figure 13. Effects of column size and storey height on horizontal displacement in X-direction

Same as above graphs, for all beam sections the graphs are made and results are obtained from it.
The conclusion of the thesis includes Study on Performance Evaluation of Structure subjected to Dynamic Loading and Study of Dynamic Performance of the Industrial Building. This section includes the effect of horizontal frequency and displacement on the looms factory building for varying Beam Size, Column Size and Storey Heights. The study is carried out for Ground+ One Storey and conclusions are extracted from the graphical results.

C. Dynamic Analysis Of R.C.C. Frame Structure For Looms Industry; International Journal Of Engineering Research And Applications (IJERA) ISSN: 2248-9622 , Vol. 3, Issue 3, May-Jun 2013, Pp.363-383

Sarthi B. Bhavsar , Yogesh D. Rathod, Sunil H. Kukadiya, Gaurang A. Parmar, Jigar K. Sevalia; "Dynamic Analysis Of R.C.C. Frame Structure For Looms Industry".According to authors, all real physical structures, when subjected to loads or displacements, behave dynamically. Industrial Building which are equipped with machineries are bound to be subjected to vibrations.
Problems of the dynamics of bases and foundations are important from an economic standpoint as well therefore, to understand the response characteristics of the power looms industry structure, dynamic analysis was carried out for Ground + One Storey industry framed structure using STAAD.Pro software.
In this paper, an attempt has been made to study the effects of various structural parameters like Beam Size, Column Size and Storey Height variation on Frequency and Displacement of the industry building which will fill the lacunae by serving as guidelines to structural engineers and industry people.

D. Response Of Reformative Effort For Vibration Reduction Of Industrial Building;International Journal Of Current Engineering And Technology ,ISSN 2277 – 4106,Vol.3, No.2 (June 2013)

Sunil H. Kukadiya , Yogesh D. Rathod, Sarthi B. Bhavsar, Gaurang A. Parmar And Jigar K. Sevalia; "Response Of Reformative Effort For Vibration Reduction Of Industrial Building". The Authors presented thatvibrations are becoming increasingly important in the design of industrial structure, but they are not usually of primary concern in the design process. In response for the requirement for more efficient and environmentally friendly industry, modern designs are becoming lighter and more flexible.
So, it is necessary to execute dynamic analysis of structure, which provides the possible routes to improve the performance, particularly for innovative techniques that are being considered for future designs.
This paper highlights different structural possibilities for improving the performance of industrial structure by incorporating several reformative efforts such as Cross-Bracing, Jacketing, Tie-Beam, Haunches, etc.

E. Dynamic Analysis Of Foundation Supporting Rotary Machine ; Int. Journal Of Engineering Research And Applications, ISSN: 2248-9622, Vol. 5, Issue 8, (Part - 2) August 2015, Pp.34-45

Utkarsh S. Patel, Siddharth H. Mangukiya, Ankit L. Miyani, Hardik A. Patel, Smit V. Vora, Dr. Jigar K. Sevelia; "Dynamic Analysis Of Foundation Supporting Rotary Machine".In Context to this paper, with the advancement of technology in the field of industry, high speed machinery has been developed.
As the speed of machinery has increased, vibrations also increased. Machines transmit vibrations to the structure supporting them. Hence, it is important to design and develop such structure which sustains the vibrations of machinery.
Hence, in this paper it has been aimed to execute the study on foundations supporting rotary type of machine like blower.
In this paper, the most important parameters like frequency and amplitude are considered while execution of analysis of machine foundation supporting blower type machine.
This paper shows, better interface between foundation designer and machine manufacturer for better performance of machine.
The design aids/approaches for foundation design is also described in this paper and an attempt has been made to study the dynamic behavior of a foundation structure for blower type machine subjected to forces due to operation of blower machine. Two different types of foundations for Rotary type Machine that is Blower have been studied in this paper.

III. CONCLUSION

From the above literature we conclude that

1) The old textile industrial structures were not designed considering the vibration criteria in context.
2) In the modern times it is so much necessary to study the vibration effects developed by the looms machine.
3) If we consider the dynamic structural parameters in study and give them as remedies we can reduce vibration effects developed on existing structure.

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