1. INTRODUCTION

Autoclaved Aerated Concrete or AAC is a steam-cured cementitious product manufactured from a mix of pulverized fly ash, cement, lime, gypsum and an aeration agent, giving it its unique porous nature. AAC is an intelligent building solutions system because of its light weight, excellent thermal insulation and acoustic properties and energy efficiency. AAC today is considered a revolutionary precast building material offering a unique combination of high durability and strength, low weight, unprecedented buildability and superior ecological green features. This material is a state of the art green building material which is in other parts of the country fast replacing ordinary red clay bricks and fly ash bricks for its superior quality and saving potentials in the first and revenue maintenance cost of building. The blocks and panels are used for all kinds of walls, external or internal, load bearing or non-load bearing walls etc. AAC is the material of choice for all building applications.

Autoclaved Aerated Concrete technology was invented by a Swedish scientist Mr. John Axel Ericson during 1920s. However, it took a long time for the invention to be commercially viable and to be in wide use in a developing Economy like INDIA. However, AAC blocks are widely used in Europe, Middle East, South East Asia, China and USA.

The steps of AAC Block manufacturing process:

- Raw material preparation and mixing
- Panel reinforcement preparation
- Cutting
- Green separation
- Autoclaving
- Packaging

2. EFFECT OF INFILL

- The stresses, in the infill wall, however, were found to increase with the increase in Young’s Modulus of elasticity due to the increase in stiffness of the system, attracting more forces to the infill.
- The infill wall enhances the lateral stiffness of the framed structures; however, the presence of openings within the infill wall would reduce the lateral stiffness.
- The fundamental period only slightly increases as the infill wall thickness increases, since the increase in thickness only increases the mass of the structure rather than its stiffness.
- The infill was assumed to crack once the stress in the infill exceeded the ultimate compressive stress of the infill material.
3. ROLE OF INFILL

Existence of infilling is noted to increase the ultimate lateral resistance of the system while resulting in less ultimate lateral deflection for lower infilling. The effect on both parameters is more pronounced for higher percentages of infilling. Two phenomena arise through the stage of loading and result in the response nonlinearity. First is to find the stiffness degradation of the reinforced concrete with load-induced orthotropy depending on both the applied dynamic load and the inherent deformational characteristics of the frame. Second is to find the progressive strength reduction of either of the diagonal struts, which is supposed to be sequential according to level of loading. Conventional half-brick wall infilling is noted to affect nearly all of the dynamic parameters of reinforced concrete frames. Infill influence on the kinetic and kinematic coefficients related to lateral excitation is found to depend on frame features such as number of stories and number of bays as well as infill amount and position. Lower location yields the higher strength, stiffness, and frequency of the system. Nonlinearity of the behavior is basically due to stiffness degradation, which consequently results in frequency attenuation during the loading regime.

4. EQUIVALENT DIAGONAL STRUT FRAME METHOD

Significant experimental and analytical research is reported in literature, which attempts to understand the behaviour of infilled frames. Studies show that infill walls decrease inter-storey drifts and increase stiffness and strength of a structure. Ductility of infilled structure, however, is less than that of bare structures. Quality of infill material, workmanship and quality of frame-infill interface significantly affect the behaviour of infilled frames. Different types of analytical macro-models, based on the physical understanding of the overall behaviour of an infill panel, were developed over the years to mimic the behaviour of infilled frames. The single model is the most widely used, though multi-strut modals are also sometimes reported to give better results of the available models. Thus, RC frames with unreinforced masonry walls are modelled as equivalent braced frames (EBF) with infills walls replaced by “equivalent struts”.

Equivalent Diagonal Strut Method is used for modelling the infill wall. In this method the infill wall is idealized as diagonal strut and the frame is modelled as beam or truss element. Frame analysis techniques are used for the elastic analysis. The idealization is based on the assumption that there is no bond between frame and infill.

The width of the diagonal strut is given as

\[ w = 0.175 \left( \frac{L}{h} \right) - 0.4d' \]

Contact length parameter,

\[ \lambda H = \frac{H [E_i \sin 2\theta / 4E_f I_c h_m]}{10} \]

Fig.1. Diagonal strut modelling of infill panel

Where,

- \( E_i \) = modulus of elasticity of infill material
- \( E_f \) = modulus of elasticity of frame material
- \( L \) = beam length between centre lines of columns
- \( L' \) = length of infill wall
- \( h \) = column height between centre lines of beams
- \( h' \) = height of infill wall
- \( I_c \) = moment of inertia of column
- \( t \) = thickness of infill wall
- \( d' \) = diagonal length of strut
- \( \theta \) = angle between diagonal of infill wall and the horizontal in radian

4. RESPONSE SPECTRUM METHOD

The basic mode superposition method, which is restricted to linearly elastic analysis, produces the complete time history response of joint displacements and member forces. In the past there have been two major disadvantages in the use of this approach. First, the method produces a large amount of output information that can require a significant amount of computational effort to conduct all possible design checks as a function of time.

Second, the analysis must be repeated for
several different earthquake motions in order to assure that all frequencies are excited, since a response spectrum for one earthquake in a specified direction is not a smooth function. There are computational advantages in using the response spectrum method of seismic analysis for prediction of displacements and member forces in structural systems. The method involves the calculation of only the maximum values of the displacements and member forces in each mode using smooth design spectra that are the average of several earthquake motions.

The performance of ALC block infill was superior to that of Conventional brick infill in RC frame. Therefore, The ALC block material can basically be used to replace conventional bricks as infill material for RC frames built in the earthquake prone region.

The behavior of an infilled frame is dependent on the properties of frame and infill; hence, the response of such frames should be based on overall frame to infill composite action rather than on isolated bare frame behavior.

Effect of dynamic loading on the behavior of masonry infilled R.C. frame may be investigated to determine the characteristics with ease.

The contribution of partial infill walls must be well identified so that while analyzing models for real structures, the composite action of the frame and infill would be realized.

By considering the infill wall the roof displacement of the structure reduces.

1. REFERENCES: