Challenges to Elevatoring in India

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The 146.6m high Pyramid of Khufu (also known as Pyramid of Giza) in Egypt, completed in 2570 BC, and the 122m high Jetavanaramaya in Sri Lanka on the Indian sub-continent completed in 301 AD (source: https://www.realmofhistory.com) stand testimony to man's tall ambitions from prehistoric times. Closer home, we had the 73m Qutub Minar, a brick minaret of a comparatively newer 1220 AD vintage. Without exception, these were all structures principally driven by religious or political compulsions and not for human habitation.

The reference to a tall building for habitable purposes can be found in the bible "… And they said, let us build us a city and a tower, whose top may reach unto heaven; and let us make us a name……."(source: Genesis 11: 4). Researchers like the late Professor J E Gordon have estimated that

Photo Courtesy: ThyssenKrupp

Pyramid of Khufu in the background

Jetavanaramaya

this building could probably have reached a height of 2 km. The biblical reference goes to elaborate that the building did not get completed as God intervened and confused the language so that people had no option but to abandon the project and disperse around the world. However, in all likelihood, the disruption would not have required God's intervention.

In reality, till the middle of the 19th century, the tallest buildings for human habitation were limited to 6 floors as climbing so many stairs was just not practical (reference Wikipedia). Elisha Graves Otis' "All Safe Gentlemen" demonstration of a safe elevator at the New York World's Fair at the New York Crystal Palace in 1853 changed all that. This one invention singlehandedly provided the impetus to realistic tall ambitions that continue to alter the skylines of the cities of the world.

After the structure, for which the know-how and material have existed from ancient days, what made a tall building a sustainable reality is the invention of the safe elevator. Today's reality is that at many projects, landscaping and toilet fittings take priority over elevators through all stages of the project – design, procurement, execution and operation.

Challenges in Elevatoring

Low priority allotted to elevatoring

This is the challenge number 1, which in turn sets the base for the other challenges.

Low understanding of the science

The science of traffic analysis which forms the foundation of elevatoring design is complex. Unfortunately, not many in the field are well versed in this critical science. It is highly unlikely that the expert providing the elevatoring recommendation would have a copy of the elevatoring bibles like Gina Barney's 400-page Elevator Traffic Handbook or George Strakosch's 600-page Vertical Transportation Handbook, let alone have put in the effort to master this science.

With the availability of powerful software to carry out traffic analysis, many designers venture to provide design recommendations without the required mastery of the subject. As Richard Peters, the author of Elevate, while introducing his popular traffic analysis software warns, "Elevate is an extremely powerful traffic analysis tool. However, it will not make the user an elevator traffic analysis expert."

The lack of understanding and appreciation also extends to how the recommendations are implemented. For instance, the placement and sizing of elevators tend to be dictated by the aesthetic requirements or FSI/FAR compulsions without recognising that the quality of service that can be provided by 8 elevators in a group is not the same as 2 groups of 4 elevators or 4 groups of 2 elevators.

Faulty design basis

Many buildings have adopted the elevatoring based on thumb rules and do not have a design basis report. Elevatoring is then based on a guesstimate from other buildings without the realisation that two supposedly identical buildings might have very different elevatoring requirements.

When a design basis report does exist it is not uncommon to find that it is a "worked backwards" report, which has been produced to suit whatever elevatoring has been provided - effectively the population assumption which should be the primary input for traffic analysis becomes the design output.

Non-compliance to codes & standards

Design standards should have been the least of the problems for India considering that we have a robust IS 14665 (standards for elevators) and the National Building Code 2016 (Section 5A, Part 8 details the codes for elevators). Incidentally, India is one of the few countries that has elevatoring design guidelines detailed in its National Building Code.

Unfortunately, a number of architects, developers, consultants and elevator companies are either ignorant of these standards and codes or prefer to ignore them. It is common to see buildings and elevators that are in operation but are not in compliance with the applicable codes and standards and are often bordering on the potentially hazardous. These non-compliant elevators are not limited to inconspicuous locations and buildings but can also be seen in prominent public locations in clear view, which points to the nonchalance involved.

The code and standards development process of the Bureau of Indian Standards is based on a collaborative approach amongst constituents seeking their opinion and comments. Though statutory authorities and user groups are invited to participate in the process, the responses

are lukewarm. The outcome is that the statutory authorities and experts then often ignore the national codes and standards. At times, the requirements that are laid out are either against the code and standard or are technically impractical with possible dangerous implications. It is anybody's guess how the suppliers then fulfil the "no objection certificate" requirements.

Lowest bid

Though the procurement team will happily pay top notch money for sanitary fittings and marble floorings, the lowest price is normally the primary decision basis for elevator procurement. Considering that elevator companies are not charity institutions, these low prices cannot be achieved without compromises. The compromises probably explain why many new elevators are coming up for replacement / modernisation in 15 years or less, against the 25 years of the older vintage. This could also explain the incidents including fatal accidents that have escalated over the recent years.

Cost compulsions are also evident when specifications of speed, capacity and even number of units are reduced without design evaluation, and purely on what has now become a fashionable phrase – "value engineering", or when all else fails "management decision". Unfortunately, for the final owner or facility manager, rarely would the value engineering expert or the management be around to address the problems of inadequate elevatoring they subsequently will face. With the trend towards affordable housing, what will get further compromised to reduce costs, is worrisome.

Execution

Elevator installation is a very specialised technical activity requiring a high level of accuracy. The components are also precision engineered and to ensure quality, reliability and life of equipment, they require to be installed in a fairly clean and dry environment.

Elevator installation schedules tend to be linked to the occupation certificate or other statutory requirements. As a result, elevator installations are carried out within incomplete site conditions with water seepage, slurry and dirt, and is completed well before the building really requires them. The sophisticated and precision engineered components would have been submerged in water and slurry, which is even more prominent during the monsoon. The door sills and tracks would have solidified cement on them thus affecting the door operation and thereby the reliability of the elevators.

Elevator installation schedules are also set to meet the need for temporary construction elevators. While this is an understandable requirement, the need to save costs forces the usage of the final elevator components for temporary purposes to carry cement, debris etc. By the time the first owner moves in, the elevators are almost second hand.

It also happens that the schedule is unrealistic, and the material arrives way ahead of actual site readiness. This leads to prolonged storage which in bad environments damages the components and also affects the components with a shelf life. It becomes a double whammy when the warranty provided by the supplier expires before installation and commissioning.

The quality of civil construction is another issue. While construction inaccuracy (plumbness and squareness) has an impact, there have been instances when the quality of material is so bad that the fasteners used are ineffective, thereby affecting the stability of the installation.

Building occupation pattern

Another challenge is that buildings, particularly apartments, tend to get occupied over an extended period of time, which could span into a number of years. Before moving in, the owner sends his personal contractors in, who with very little supervision by their employer, show very little respect for the convenience of the occupants or safeguarding the elevators. The elevators become garbage elevators, while the workers with their tools vandalise the elevators. With this misuse, by the time the building is fully occupied it is almost time to replace most of the exposed equipment.

Maintenance

An elevator is a unique piece of equipment – "Used by All, Owned by None", recognised only by its non-availability. This attitude can be seen in the apathy towards elevators. It is unfortunate that the elevator hoistway becomes the convenient garbage chute while the space between the doors becomes a spittoon. Often owners leave taps open or the firefighting sprinkler is tested with the invariable consequence that follows - the hoistways are flooded, damaging the sophisticated electronic equipment.

Costs also are a driver for deciding on maintenance contracts. Owners, particularly housing societies, will adopt

the cheapest option without recognising that the consequences could involve costly and serious incidents including fatalities.

Unreliable power supply

Elevators require a fairly reliable and stable power for operation. Unfortunately, the power situation in many states in India is unreliable while the quality is poor. Power failures cause the elevator to stop abruptly making it very uncomfortable for passengers – faster the elevator more the discomfort. The subsequent entrapment escalates the fear. The resultant jerk also impacts the components. Frequent voltage spikes and drops affects the reliability of the components.

Lack of trained and experienced resources

Over the last decade, India with its ever-changing skyline, has become the fastest growing and second largest elevator market. The development of the trained and experienced work force has not kept pace with this growth. In recent times, companies have scaled up the classroom and simulated training programs. However, classroom training can never be a substitute to hard core and time-consuming hands-on field experience.

Statutory oversight

Any inspection can only capture a snapshot in time. It is not a substitute to a robust design, installation and maintenance of equipment that adheres to standards and codes. Yet a statutory regulatory and inspection body is still a prerequisite to safe and quality elevatoring. However, elevators in India is a state subject and it is up to the state to adopt and implement standards and relevant Acts & Rules. Many states in India do not have a statutory norm for elevators and escalators. It is left to the conscience of the buyer and supplier to supply and maintain a product that is of quality, safe and meets the national standards and codes.

Limited User knowledge

Elevators and escalators are designed and built as the safest means of transport available to mankind. Yet they are electro-mechanical equipment and not toys to be taken for granted. Unfortunately, even the most savvy elevator and escalator rider is not fully aware of the do's and don'ts connected with elevators and escalators. With very limited support from the industry, the efforts by the Elevator & Escalator Safety Trust (registered with the Charity Commissioner (more details at www.eest.in) to address this issue has been moving at a snail's pace. User groups like mall owners and influence groups like schools find the free training imparted as unnecessary and create bottlenecks for the supportive companies like Johnson Lifts, Otis, Schindler and ThyssenKrupp.

Conclusion

Designers and developers need to recognise that the only time to ensure adequate elevatoring is during the design stage. Once constructed with wrong number of cores or incorrect hoistways sizes or wrong arrangements, there is no remedy available other than bringing the building down.

If something is very cheap, in all likelihood it is because it is cheap in quality. And, therefore, adopting this approach for the lifeline of the building is fraught with consequences to property value and life. The Indian standards and codes for lifts and escalators have been drafted and put together by veterans with a collective hands-on experience and foresight of 100s of years. Diluting them cannot be achieved without consequences.

When confronted with conditions during execution and maintenance, the standard argument put forth is that the project conditions should be known and that the elevators should be designed to handle those situations. The question that arises is why these technically impractical arguments are not extended to the sanitaryware or personal phones or personal vehicles. While suppliers have been trying to address the problem, there really is no substitute for a stable and reliable power supply.

There are exceptions to the trend, but that the exceptions are in the minority is a reality. On the positive side, ignoring elevatoring would force people to use the stairs. This in turn would help reverse India's march towards becoming the cardiac capital of the world.

ISEE - International Sourcing Exposition for Elevators & Escalators 2020

Date: 5 - 7 November 2020

Venue: Bombay Exhibition Center – BEC Mumbai, India

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TAK Mathews has over three decades of experience in the vertical transportation industry. He is a representative on the P-4 panel of the ET25 committee constituted by BIS for rewriting the Elevator & Escalator codes and is convener of the panel (CED 46:P16) for writing codes for Lifts and Escalators for the National Building Codes of India 2016. A Chartered Engineer and a Fellow of the Institute of Engineers (FIE), he is certified by the International Association of Elevator Consultants, Asia. He was the founder editor of Elevator World India and co-founder of the Elevator & Escalator Safety Trust. He is the founding director of TAK Expo which will hold the International Sourcing Exposition for Elevators and Escalators from 5-7 November 2020.