



## Advances in

# Construction Engineering, Design & Machinery

This article delves on how modern engineering practices and adoption of present day construction machinery has helped in speed up the process of erecting the structure

Roti, Kapda Aur Makan – if these three basic essentials of a human being are to be rated in its order of importance today, then the least important amongst the three has become the most difficult to acquire – at least in big metros.

What is prohibitive is the cost of acquiring the Makan – or a house in these metros. If we analyse the reasons for its prohibitive pricing then we get back to first principle of economics – i.e. Demand Vs. Supply. If demand is more than supply the prices will continue to spiral upwards. Since supply of land is limited (unless the sea is reclaimed) the population is increasing and demand is climbing, this situation is unlikely to be reversed ever.

How do advances in Construction Engineering, changes in the design concept and employment of modern machinery hope to contain these prices? We have seen in the last issue detailed design process. In this issue we will see detailed construction engineering process.

Construction Engineering envisages the process through which the designed structure comes on a given plot of vacant land. Before the structure sees the light of the day, the plot of land goes through transformation in many different ways. This process can be briefly classified as below:

- ◆ Excavation
- ◆ Foundation
- ◆ Superstructure i.e. core and shell
- ◆ Brickwork or block work
- ◆ Plastering
- ◆ Finishes

We will now see how modern engineering practices and adoption of present day construction machinery has helped speed up the process of bringing up the structure.

#### Excavation:

What was purely a manual task just a few decades ago is now completely an automated activity. JCBs, Poclains, and various earth moving machinery like dumpers and tippers help excavate the plot, move and cart away debris to other sites where back filling is required. What used to be the most time consuming activity in earlier times now takes the least amount of time. Lesser time taken leads to lesser labour costs, however employment of modern excavation tools leads to higher machinery rentals.

#### Foundation

'Stronger the roots higher the chances for a tree to withstand storm'. Similarly stronger the foundation for a building higher are its chances to survive natural forces that lead to wear and tear and calamities like earthquake. Driving piles for creating a stronger foundation for modern highrises, saves us from excavating the entire area under the plinth to proportional depth. This leads to saving in labour cost on one hand but increases the cost of machinery rental on the other hand.



#### Super Structure

Imagine constructing a modern 50 storied building without the help of tower cranes, concrete pumps, passenger lifts etc. It will not only take considerably longer time but will increase the labour costs enormously. These days a 50-storied superstructure with a floor plate of 20000 sft. is built in less than 2 years. This was unimaginable just a couple of decades back without the help of modern construction machinery, advances in formwork and advances in communication methods.

#### Brick Work

Modern methods of erecting concrete walls or pre cast walls

have given way to manual task of erecting walls with brick or blocks. Concrete or pre cast walls have led to thinner partitions thus enabling higher carpet area creation. Higher available carpet area leads to higher utilisation within permissible FSI.

#### Plastering

Use of film faced plywood and mirror finish steel shuttering plates has led to roof and walls being ready to receive the final treatment without going through the plastering process. This has led to reduction in material as well as labour costs.

#### Finishes

Most advances in construction engineering seen in last few decades are in finishes. Be it flooring, painting, electrical, plumbing, fixtures or the HVAC systems. However this also is the area which has contributed maximum to increases in per sft cost.

The main objective of any structure is to offer shelter and safety to occupants and the property from external forces – both natural as well as man made. However, good construction engineering methods and practices offers all of the above aspects like unique or pleasing shape, distinguishing elevation, adaptability to withstand natural wear and tare, strength to protect from natural calamities, speedy completion, ease of servicing, natural ambience, minimal maintenance cost over long period, over and above the basic necessity of shelter and safety. Good Construction engineering must make occupants of a structure a contended lot. For almost 95 per cent of the population, buying a house is the single largest investment done during his/her entire life time. Modern construction engineering should make this decision bring perennial smile on faces of buyers of these properties. This is possible only if everyone involved in this process looks at this activity from a service point rather than a business proposition.

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