Hybrid Composite Technology- the Dark Horse of the Indian Infrastructure Sector

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Infrastructure development is directly proportional to the economy and is a key indicator of economic growth. World powers have heavily invested in infrastructure development to support the system and other varied sectors of the economy. The Indian construction sector, in particular, has been significantly affected by the pandemic. However, this year will be fruitful, as the sector appears poised to regain growth and seize various opportunities with the ease of global markets. The Indian construction sector began the year with DRDO partnering with Maiwir Engineering to complete a 7-storey state-of-art research facility at the Aeronautical Development Establishment campus in Bengaluru, spreading across 1,30,000 sq. ft. in a record timeline of 45 days using hybrid construction technology. The quest for a greater economy, concerning material costs and reduced construction timelines, has resulted in innovative solutions that seek to combine construction materials and methods to an optimum effect. One such adaptation is the use of hybrid construction technology.

Hybrid construction technology is a mix of conventional and pre-engineered methodology, using a combination of structural steel and reinforced concrete to form an efficient and sustainable design model. The highest level of optimization is achieved in resolving complex engineering problems in well planned phases. First, the structural steel members and partial pre-cast members are manufactured off-site at a factory yard. In the second phase, ready-to-assemble members are transported to the construction site, and in the third phase, they are installed in a calibrated manner using machinery.

Decoding this Innovation

The hybrid construction technology is a highly flexible building system. It is composed of horizontal and vertical structures, which can be used either separately or as part of a system depending upon the required standards. It is a global, effective, and cutting-edge solution for industrial, commercial, and residential structures, as well as large works, infrastructures, facilities, renovation, and conservative restoration. An offsite precast yard is setup for the fabrication and assembling of precast elements. Once all the members are installed to form a structural frame, a cast in-situ concrete pour is done monolithically to achieve the structural integrity.

The Way Forward

The main areas of focus in the near future are high-rise buildings for commercial, residential, educational institutions, hospitals, data centers, and urbanization of logistic corridors. Just like India's space program "mission to Mars," the mission to build can happen at a fraction of the cost with local materials and skill-developed teams, and we shall target and improve the country's GDP growth with infrastructure development and spending. Over the past 3 decades in India, there has been a quantum jump in construction technology, especially in steel structures related to design concepts, erection methodology, manufacturing, section profiles, code provisions, etc.

> ***The evolution of composite structures is one such revolution, which has gained significant importance and has mostly replaced conventional construction techniques.***

Application of Hybrid construction technology

- High Rise Residential & Commercial buildings
- Hospitals & educational institutions
- Bridges
- Seaports & airports
- Data centres
- Recreational centres

The industry can reap the benefits of both worlds of conventional concrete construction and precast structural construction. This new combination of technology ensures flexibility in terms of design and also faster project deliverables without compromising quality and onsite safety. It has proven to produce high-quality structures in record timelines, resolving complex engineering projects to cater for the rapid growth of infrastructure in the country.

The Importance of Hybrid Construction Technology

No or minimal wastage during the construction phase, which roughly accounts for 1–5% in conventional RCC buildings.

- Improved structural integrity
- Faster construction reduces the timelines by up to 60%
- Optimized resource utilization
- Wind loads & seismic load resistant
- Significant reduction in construction costs

While fast-growing economies like China and other developed economies in Europe and the Middle East are adopting technological advancements for constructing complex engineering projects and residential structures, with this revolutionary technology, India can witness itself on the global map as a developed economy by building faster and more economically efficient structures than any other global power.