Modulo – The technical evolution of multi-site construction

ARTELIA's aim is to be the leading engineering expert in Standardised Modular Assembly Solutions. A great example of their commitment to innovation is the development of the MODULO concept, in partnership with a major fuel retail company.

The MODULO concept covers 4 areas of implementation: Shops, Forecourts, Fuel Systems and Canopies. Various modular solutions have been tested and implemented; carwash and canopy solutions, steel prefabricated plugs, prefabricated forecourts, concrete modular fuel systems, modular buildings; and buildings comprised of freight containers. A great exponent of the Modulo concept is the recent construction of a knock down rebuild motorway project in France, built from freight containers.

Why freight containers? They are inexpensive, easily available, watertight, resistant to extreme conditions, loads and stresses. They also provide a ready-made structure that can be stacked vertically with a high floor to ceiling height. For the motorway project ARTELIA programmed the container preparations to occur offsite which reduced the site exposure hours by 20-30%. Some of the

offsite works included: structural reinforcement, insulation, plastering partitions, HVAC installations, painting, electrical upgrades and waterproofing. A total of 49 containers were used and 4 to 6 containers were installed per day. This saved 7 weeks on the construction programme when compared to a traditionally built structure. ARTELIA and its partners were also able to reduce over 4,400 exposure hours by using this form of construction.

The freight container solution succeeded in achieving not only the key challenge of reducing construction time, but generated a number of other important benefits:

- **HSE:** the total man hours required to assemble elements on sitewas reduced
- **Cycle Time Reduction**: reduction of design and construction time by 21%
- **Value Improvement:** reduced maintenance cost
- **Quality:** improved finish - above industry standards
- **Flexibility:** easier future proofing and re-modelling
- **Total Cost of Ownership:** the building method provided a high quality finish which focused on reducing the amount of future maintenance required.

Along with the above benefits the building technique required strong leadership, cost and project management. Various challenges needed to be addressed by ARTELIA's project managers:

- Compliance with local regulations and the client's technical standards for structural stability, seismic loading, fire protection, electrical networks etc

- Educating contractors on the new form building method
- Focusing the team on delivering a high quality product for our client
- Developing a supply chain to construct and assemble building components offsite in a controlled dry environment

A Project Steerco was set up between the client, ARTELIA, architect and the maintenance manager to monitor the overall project progress, review the design specifications and ensure compliance with the relevant technical standards. ARTELIA's Project management teams worked closely with contractors to overcome their reluctance by explaining the building methodology, sharing best practices and developing a culture of teamwork. In spite of these challenges, the project was delivered in time. The feedback from the client was very positive. They were very impressed with the highly technical architectural concept, perfect site assembly and very good quality of finishes. The concept also enabled the client to differentiate itself from competitors and attract curious customers.

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