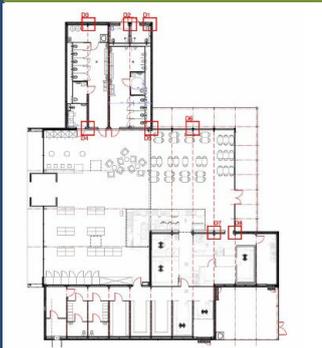




CHALLENGE

TO REDUCE WORK DURATION AND RISK EXPOSURE DURING FUEL RETAIL BUILDING CONSTRUCTION



Shipping Container Building Assembly

Artelia aims to become a leading engineering expert in standardised modular assembly solutions for retail business. This initiative has been named Modulo. It has led to the initiation and development of a new design for shop construction on fuel retail Motorway sites. By moving from a classical building type to a shipping container building assembly solution, Artelia has reduced construction duration, and hence risk exposure to workers on site, by up to 30%.

Challenge

A major oil company, Shell, has selected Artelia International to manage their CAPEX investment programmes across their fuel retail business (construction, preventive maintenance, rebrand).

A key challenge is to increase the profitability of the fuel business by reducing the site construction duration. This improvement has also provided safety improvements by reducing risk exposure and lowering risk levels during construction.

Artelia had already used prefabricated modular elements assembled on site in several countries which resulted in a reduction of the construction duration of new projects.

The specifications of Motorway sites, where buildings are frequently more than 500m² in order to host shop and catering facilities, meant that this method of construction could not be used.

Artelia initiated studies of the various types of alternative solutions that could meet this challenge.

The Artelia Solution

Artelia decided to adopt a shipping container building assembly solution to drastically reduce construction duration of Motorway sites and improve security during construction.

The use of shipping containers provides multiple advantages:

- The containers are watertight and resistant to extreme conditions,

loads and stresses. This characteristic allows them to be stacked up and provide higher height under ceiling.

- 25 to 30% of the work can be done in safe conditions in a warehouse, hence reducing work duration and risk exposure on site.
- Two different container sizes exist, offering flexibility in layout.

Some technical challenges had to be addressed to validate the feasibility of such a project:

- Prove the reliability and durability of the works and repairs.
- Comply with local regulations and client technical standards for structural stability, seismic loading, fire protection, electrical networks, etc.

Despite these constraints, development was made possible thanks to our Project Management methodology, the sharing of best practice and team skills.

This technique was successfully developed in 2012 and partially tested (half of the building only) in 2013 at a fuel station on a Motorway site called "Vrigny" (France).

Following the success of this trial, Artelia decided to perform a test on an entire building on a site called "Rosny Sud" (France), before future deployment in other countries.

Reluctance by contractors to change from traditional methods proved to be a constraint to deploying this solution. Artelia's Project Management teams overcame this

reluctance by explaining the methodology, sharing best practices and developing a culture of teamwork.

Outcomes and Key Benefits

This solution succeeded in achieving not only the key challenge of reducing site construction duration but generated a number of other important benefits.

- Health and Safety (the total man hours required to assemble elements on site is significantly reduced - by 30% - and works carried out in the warehouse are performed in safer conditions than on site).
- Cycle time reduction (by overlapping administrative instructions and activities in the warehouse, construction work duration is reduced by up to 30%).
- Value Generation (the construction cost is slightly lower than that of standard construction).
- Higher Quality level (due to increased activities in a controlled warehouse environment).
- Standardisation (solution can be easily replicated across sites and countries).
- Flexibility for future modification/redevelopment.

The shipping container building assembly method has also enabled our client Shell to differentiate itself from its competitors by being the first to implement this innovation on retail sites.