Vanguard
Healthcare Solutions

VOLUMETRIC CONSTRUCTION & HEALTH

Vanguard Healthcare Solutions

What are the benefits of volumetric modular construction for healthcare providers? What are the considerations, the potential challenges and how does a project work? And what are the advantages for hospitals and healthcare settings in achieving high pre-manufactured value for their projects?

In this guide, we share our experience and expertise as a construction and infrastructure developer working solely in healthcare, offering practical guidance and answers to the questions healthcare providers have when considering volumetric modular construction for their next project.

WHAT IS VOLUMETRIC CONSTRUCTION?

There are a number of different types of Modular Construction. Vanguard Healthcare Solutions, through our factory in Hull, uses modular building techniques to create high quality clinical spaces for use exclusively in healthcare. These include sector leading operating theatres, wards, clinics, central sterilisation units, endoscopy suites, decontamination suites, surgical hubs and community diagnostic centres.

Modern methods of construction or modular construction is a process which focuses on off-site construction techniques, such as mass production and factory assembly, as alternatives to traditional building.

In our guide we'll share the benefits of modern methods of construction for the health sector and how the process works, whilst also highlighting considerations through the supply chain, from land identification and acquisition through to planning, design, construction and service and management.

Volumetric Construction: a definition

Volumetric Construction is the process of assembling fully enclosed, six-sided building modules in an offsite factory, bringing them to site and then joining them together to construct one large building.

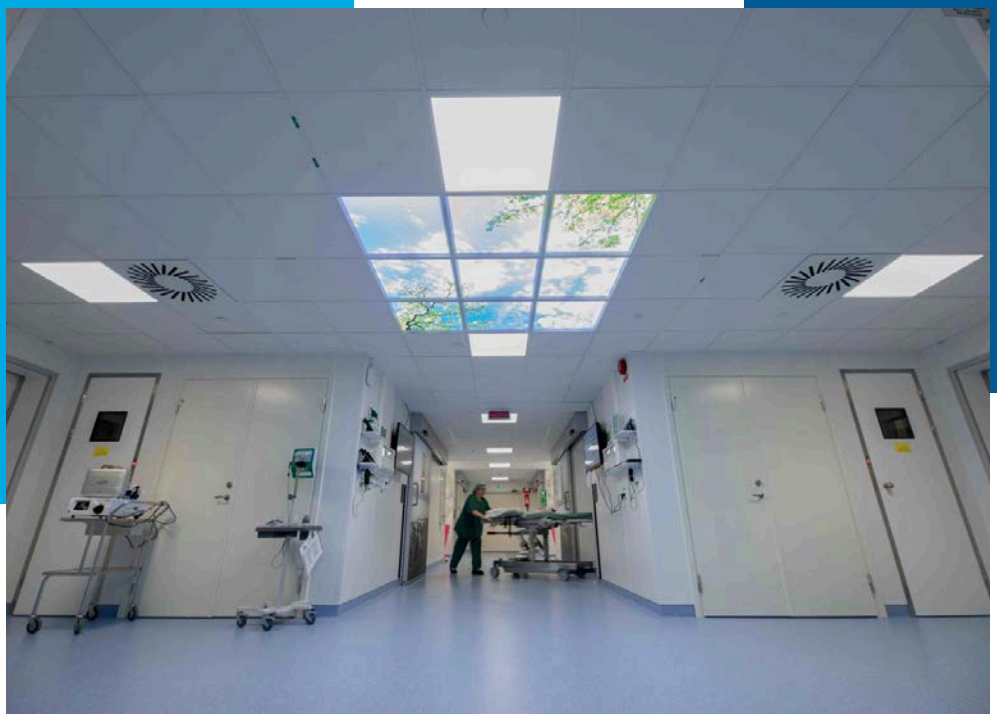
WHAT ARE THE BENEFITS OF VOLUMETRIC CONSTRUCTION?

For healthcare settings looking to add capacity at pace and in the most cost effective way and minimising disruption to patients and staff – volumetric construction offers many benefits.

Projects completed by Vanguard have a high ‘PMV’ or ‘Pre Manufactured Value’ with up to 90% of work and construction completed on modules before they arrive on site.

Other benefits include:

- Certainty of delivery
- Offsite manufacture is carried out within a controlled factory environment using best practice lean manufacturing principles - that means projects are not impacted by bad weather in the same way traditional construction may be
- Low disruption - modules are delivered to site fully fitted and installed using a crane
- Certainty of project costs
- A controlled working environment enables speedier project completion
- Projects can be completed up to 40% quicker than traditional construction
- This leads to a reduction in projects costs
- Multiple phases of the building can be worked on simultaneously, for example the factory could start work on the ground floor modules at the same time as the foundations are being laid.



IMPROVED AND CONSISTENT QUALITY

Offsite construction allows for the use of standardised processes and tighter controls, which deliver improved and consistent levels of quality in the finished product. This helps eliminate the need and cost for additional work to be undertaken onsite, minimising disruption to patients and hospital staff.

REDUCED ENVIRONMENTAL IMPACT

- Modular Construction can deliver a reduction in both the embedded and operational carbon, within a project.
- Buildings have a better ‘air tightness’ which reduces the energy needed to heat the building.
- Reduced on-site construction reduces traffic flow and pollution.
- And with early engagement from the design team, as much as a 90% reduction in wasted material can be achieved.

REDUCED DISRUPTION OF LOCAL COMMUNITIES

Hospitals and health facilities, by their very nature, form the beating heart of communities. Anything that can be done to reduce disruption for those using healthcare facilities – patients, visitors and staff – is therefore a huge benefit.

With a high PWV and the bulk of construction and fit out completed by clinical expert constructors such as Vanguard off-site, project times are reduced. This means projects are completed more quickly, with less noise, air pollution and traffic disruption.

IMPROVED HEALTH & SAFETY

Protecting health and safety, particularly in a health environment, is essential.

With up to 90% PMW (pre-manufactured value), the risk of on-site H&S incidents can be significantly reduced. There is reduced need to work at height, for example.

HOW DOES A VOLUMETRIC CONSTRUCTION PROJECT WORK?

WHAT IS THE PROCESS?

Given the highly specialised nature of healthcare, and its very specific requirements, the earlier a construction partner such as Vanguard can become involved in a project, the better. Our team of experts can offer advice on which solution will best to meet the hospital, Trust or Health Board needs.

That may include a ‘plug and play’ option, mixed modality (using pre-built mobile facilities in conjunction with modular buildings) or a full turnkey experience. We can support with design, planning and construction through to helping to staff the finished healthcare facility.

Broadly, the process breaks down into 5 give stages, and considerations for each stage of the process

Land Identification/Acquisition/Planning

No two projects are the same. Some hospitals have clearly identified areas where construction is required, others have different sites which may be suitable for a new healthcare facility. Our team can help healthcare providers and their estates teams consider all aspects of potential sites from utilities to access, impact on patients and other users, proximity to other services and more.

DESIGN AND PLANNING

As a part of the feasibility of development study, you will have had outline plans produced identifying how many modules will be included in the development. Once a site is identified, a detailed set of plans will need to be produced.

When using volumetric construction, early engagement of the design team is essential. They can help develop a configuration of modules to create a site which best meets the needs all stakeholders.

THE KEY CONSIDERATIONS FOR DESIGN/MANUFACTURING/CONSTRUCTION

We aim to make sure any design delivers standardisation to maximise manufacturing performance and minimise waste. We also consider:

- Performance specification
- Interfaces between foundations, central cores, existing buildings.
- Structural loadings and grid
- Fire compliance
- Standardisation of production
- Installation prioritisation
- Thermal performance of the modules and air permeability
- Façade
- Services and connections
- Ventilation
- Heating

MANUFACTURING CONSIDERATIONS

Unlike traditional construction, over 80% - and in Vanguard's case, sometimes up to 90% - of a volumetric construction project is built in a factory environment. This allows for greater control over the process and consistency of construction.

This means we can introduce standard operating procedures and always look to identify areas of improvement for product quality, product development and increasing productivity. We use standard processes, materials and skills and have a balanced production line for modules, working together at the highest efficiency.

LEGAL CONSIDERATIONS

A different approach to construction requires different legal and contractual matters including legal ownership and when ownership title of the modules is officially completed, the associated risk of damage in storage or transit.

Another consideration is quality control and provision of access for progress monitoring during the manufacturing stage - Vanguard welcomes visitors to its Hull factory to review progress and inspect their modules.

CONSTRUCTION CONSIDERATIONS

Investing time and effort in design and setting out volumetric modules will work to tolerances that are not normally achieved in the construction industry.

Vanguard modules are built to a +/- 2mm tolerance. We carefully work with the client to make sure that anywhere the module will interface – structures, foundations, connections to existing buildings etc – are properly considered and the proper precision applied.

Other key considerations in the construction stage of a volumetric construction project are:

- Transport logistics including transport, unloading and installation
- Early engagement with groundworks and utilities teams
- Crane lifting capacity, site location and jibbing configuration
- Services and utilities
- Public and site safety
- Weatherproofing.

FAQ's

How does your design prevent acoustic and thermal transfer between modules – confidentiality may be key in healthcare, as are peaceful and quiet environments?
Our buildings are constructed from modules that bear only on their corners. This approach limits the contact between adjoining modules, giving excellent thermal and acoustic performance.
We want to ensure our clients receive the flexibility they require; therefore, we can configure our products to meet your exact requirements.

Can I specify a different fixtures and fittings for the modules?
All of our modules are specifically finished to meet the needs of the clinical teams who will be working with patients within them. Our internal design team will work with you.

Will the building shrink or move once all the units have been installed?
No there will be no shrinkage of the buildings as the primary structural material used in our modules is Hot Rolled Steel. This approach produces primary columns that support the modules. As the building is assembled, the load in these columns increases, but the load in each module remains the same, this minimises any settling effects. Transport lifting and staking trials have proved that our system does not suffer from deflection or decorative cracks from transport, lifting or assembly.

Core Principles to Delivery Successful Modular Construction Projects:

1. Early Engagement with the Design Team
2. Bring Factory Precision to Site
3. Improved Collaboration and Communication

FAQ's (cont)

Is modular construction quicker than traditional construction?
Yes, a major benefit is the reduction in time required on site. A 100-module development can be assembled within weeks. We are able to adjust the output of our factory depending on the pipeline, this capability with our storage facility allows modules to be produced tailored to your project, maximising efficiency.

Can traditional construction and modern methods of construction be used on the same project?
Yes, both traditional construction and modern methods of construction can be used in conjunction on the same project. Early engagement makes sure that the interfaces can be designed beforehand.

Does modular construction offer the opportunity to improve the quality of the finished building?
Yes, due to the standardisation of the product, modular construction does provide the opportunity to deliver better quality. One of the biggest differences between modular and traditional construction is the level of control modular offers.

How does the procurement process differ from traditional construction?
We have found that collaborative, open working with early engagement of the design team is the best way to drive value for all parties and the biggest difference to the procurement process. The key to delivering a high-quality modular development efficiently is making the developments as standard as possible. By engaging with us early your development will benefit, as we work together to maximise value for all parties.

AN EXAMPLE OF ACHIEVING HIGH PMV IN A HOSPITAL ENVIRONMENT

Using modern methods of construction, Vanguard Healthcare Solutions recently worked on an innovative solution has been in partnership with a major European university hospital.

Vanguard created a bespoke modular CSSD (Central Sterile Services Department) facility for University Hospitals of Strasbourg to create an alternative location for sterile services while their existing department undergoes a refurbishment.

With a 90% Pre-Manufactured Value, the facility was built in Vanguard's Hull factory. It arrived at the hospital with major components already installed including four washers, three steam-sterilisers and a hydrogen peroxide low-temperature steriliser.

The facility also includes changing rooms for colleagues, a rest area, office, sluice and storage.

Colin Sargeant, Chief Operating Officer at Vanguard said:

"This project is a great example of how Vanguard provides facilities of the highest quality, in the shortest time. A combination of high quality and low cost means that modular facilities like these are viable for even a relatively short refurbishment project.

"As an organisation we work to a minimum if 80% PMV for modular projects - the more work completed in the factory, the better the quality control that can be offered. It also leads to much shorter installation times and a much shorter site-based construction period for the client.

"In this case we were able to push the level of PMV even further – everything that possibly could be done in the factory has been done in the factory and 90% of the facility completed before it had left our Hull base."

Vanguard
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Vanguard Healthcare Solutions is a leading global provider of flexible clinical infrastructure and services, delivering high quality, technically advanced solutions at pace including bespoke mobile and modular Healthcare Spaces that address the unique needs of each healthcare system.

Unit 1144 Regent Court, The Square, Gloucester Business Park, Gloucester, GL3 4AD
info@vanguardhealthcate.co.uk
www.vanguardhealthcare.co.uk