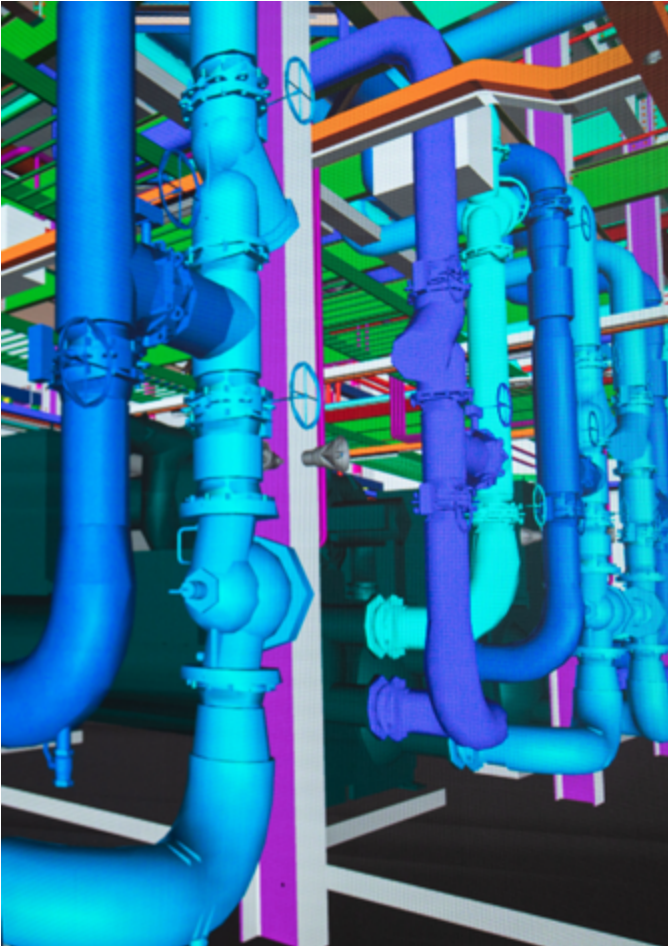




YOUR SPECIALIST

in Prefabrication,
Modularisation &
Digital Construction



People • Safety • Quality • Delivery • Value

Our **prefabrication, modularisation** and **digital construction** capabilities

Prefabrication, Modularisation and Digital Construction, as well as the application of LEAN construction techniques are employed on all our projects to drive efficiency throughout the build process. Through early engagement and collaboration, our approach allows us to continuously deliver value to our clients by making a positive impact on key project drivers such as programme, Q-EHS, budget and building life cycle costs, and ensures the best possible project outcome for our clients.

Kirby approach to prefabrication and modularisation

Kirby has utilised off-site fabrication and modular construction approach for many years. The benefits to both the client and our company can be summarised as follows:

- Reduced on-site construction duration.
- Reduced management costs and risk.
- Higher quality of final product is more efficiently achieved in factory environment specifically set up for fabrication.
- Depending on the module type, lean manufacturing in factory environment can generate additional cost savings even when additional structural and transportation costs are considered.
- Reduced on site commissioning duration post functional module testing off-site.

The “**Kirby Approach**” to off-site fabrication ensures that an in-depth review takes place on all our projects with the objective of maximising off-site fabrication. This review is led by our internal team of engineers and co-ordinators in consultation with the construction team. Once we identify the elements that can be fabricated off-site, a commercial review is completed prior to presentation for approval.

Once approved, we engage with our off-site fabrication partners to select the best location, facilities and best value product that suits the application. We have developed our supply chain over many years, which means that we always maximise the value generated, while also ensuring the product developed can be integrated into the overall project. Having the overall responsibility for the construction and functionality of the project systems, Kirby is able to take an objective view on all modules to ensure they can be installed and seamlessly integrated with the other elements of the project.

The quality of the product is assured by our internal quality control team including our Testing & Commissioning Team. We develop and manage the execution of our own SAT and FAT scripts, which can include full functionality testing when required.

To maximise the potential for off-site fabrication, it is essential that our engineering and co-ordination teams engage with the project designers and client at the earliest opportunity. This allows us to bring our construction and commercial experience to the team at an early stage. This influence has proven to add significant value by ensuring the early development of a constructible design, significant reduction in re-work and co-ordination issues, and reduced construction and commissioning durations.

We have a selection of case studies that provide the details on the recently completed projects involving modular construction – Modular Data Centres, Modular Pipe-Racks, Clean Utility Drops & Transfer Panels, WFI and Clean Steam Generation Skids



Early engagement

- Early collaboration between the project team and the design team
- Constructability and design issues uncovered and resolved pre-construction
- Visual representation with renderings developed
- Pre-construction collaboration between owner FM, Kirby construction and BIM team

Application of technology

- Point cloud scanning to produce 3D models of existing conditions and verified install
- Centralised data repository for all data storage
- Real time cloud access to all project information
- Models for full life cycle maintenance & asset management
- Mobile technology linking site and fabrication teams – Digital Snagging, Digital Remote Redlining, Cloud Based Fabrication & Installation Drawings
- Dedicated Research and Development centre investigating the latest innovations

Prefabrication and modularisation

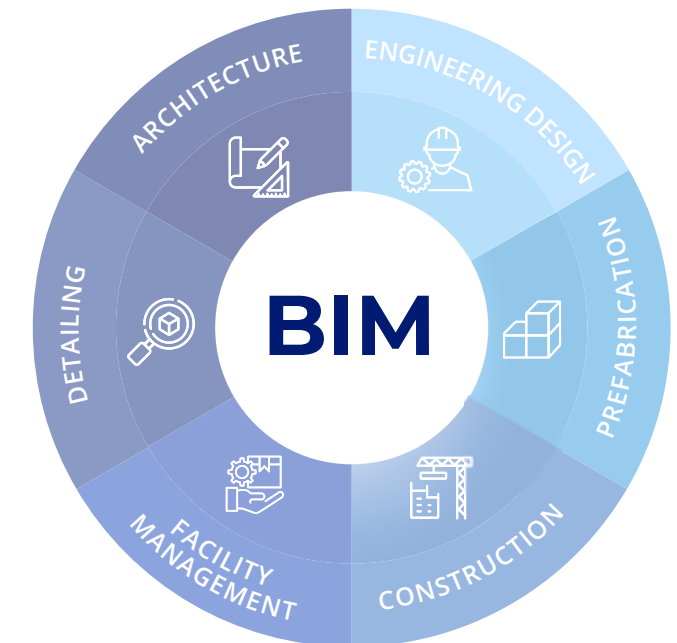
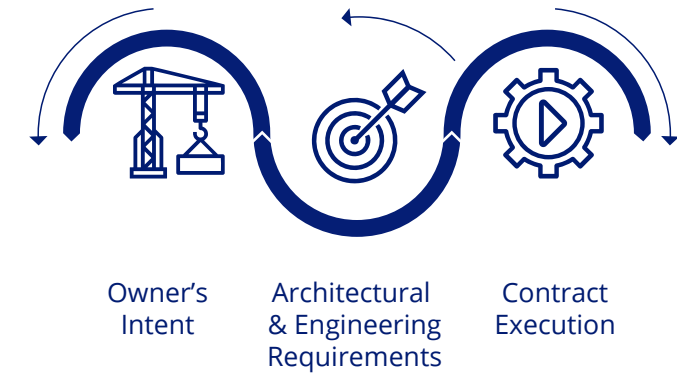
- Fully constructible 3D model development
- Detailed fabrication drawings issued to fab shop for module production
- Live link between co-ordination team, fabrication team and site team
- Quality audits on fabricated system workshops
- Modules positioned on site utilising laser guided co-ordinated system
- Reduced on-site waste
- Reduced site crew hours, resulting in lower health and safety (H&S) risk.
- Reduced on-site storage and fabrication facilities - "Just-In-Time Deliveries"

Detailed coordination

- BIM workflows employed on all projects
- All design information taken and detailed to a constructible standard
- Value engineering applied providing for a lean cost effective install
- Clash free install on site – rework considerably reduced
- Reduced man hours by utilising co-ordinated installation drawings
- Reduced site man hours by utilising prefabrication to appropriate scope

Project profile Data centre M&E scope

- Constructability issues determined before start on-site - reduced time and cost on 75% of our scope - 5% of 75% = 3.75% of total man hour saving
- Off-site fabrication - reduced time and cost on 25% of our scope - 20% of 25% = 5% of total man hour saving
- Total project saving - 8.75% of on-site man hours





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