

Bi-Steel

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## Corefast

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An innovative modular construction system for creating structural cores in multi-storey buildings





## Corefast - the future in building cores

An advanced construction technology that enables structural building cores to be created in Bi-Steel up to six times faster than reinforced concrete, and to greater accuracy.



**Above:** Corefast - the future in building cores  
**Left:** *Birmingham 1* - finished development and Corefast core under construction



As the construction industry's efforts to enhance quality, improve cost efficiency, increase site safety and reduce build times intensify, the requirement to constantly embrace new construction methodologies and materials remains top of the agenda.

The advantages of modular construction technologies and off-site manufacturing are now well recognised. However, few products and systems that truly meet the challenges of designing and building better structures are launched onto the market each year. Corefast is one successful innovation that is having a dramatic impact on the creation of structural lift/stair cores in multi-storey buildings.

Corefast is a superior construction system to traditional reinforced concrete cores - it is faster, easier to construct, more accurately engineered and can offer reduced structural thickness.

Corefast cores are made from Bi-Steel, a Corus-patented steel/concrete composite material developed for high performance applications that require strength and structural rigidity.

Bi-Steel panels are manufactured off-site, fabricated into Corefast modules and transported to the project site where they are quickly and accurately assembled to form the core. The panels are then filled with concrete to create a robust structure with outstanding strength and stiffness.

Corefast benefits, the key to reducing overall project costs, are:

- **Faster to build** – up to six times faster to construct than an equivalent concrete core
- **Highly flexible** – each solution is designed to meet specific structural and programme requirements
- **Improved efficiency** – due to better build sequence and reduced site congestion
- **Enhanced site safety** – no formwork required, resulting in fewer hours working at height
- **Greater accuracy** – improved interface with adjoining steelwork
- **Increased capital values** – slimmer walls can release additional lettable floor space

Corefast is a proven technology that is currently delivering benefits to all members of the construction project team in retail, commercial and residential schemes throughout the UK.

**Above:** Corefast cores under construction  
**Right:** Bi-Steel panel



# Corefast - save time, money and space

For multi-storey projects from eight to over 100 storeys, Corefast offers advantages over traditional construction methods.

Corefast is of particular benefit where space is at a premium, speed of construction is of paramount importance, or where superior quality of construction is specified.



## Corefast benefits all members of the supply chain

For the **Developer** of commercial schemes there's an opportunity to achieve extra rental income through earlier project completion. Furthermore, as Corefast reduces the core's footprint there is an increase in lettable space, thus enhancing the building's capital value. Whilst for the residential developer, rapid completion enables earlier sales.

For **Architects** and **Engineers**, Corefast utilises off-site techniques, lowering environmental impacts and delivering a more accurate structure. It may also be possible to reduce the number of

structural cores required due to Bi-Steel's high strength and stiffness. In addition, because Corefast is a modular system that comes to the site in panel form, it can be more easily erected in situations where access from the rear is difficult and space is tight, such as close proximity to an adjacent structure.

For the **Main Contractor**, Corefast offers a simplified construction methodology that eliminates temporary formwork, enables a faster, more efficient and flexible build sequence, reduces site congestion, allows more efficient use of site space, improves accuracy and enhances safety.

For **Steelwork Contractors**, Corefast enables them to offer a more complete package for the main structural frame of the building and to have better control over their part of the construction programme as they are no longer reliant on others providing the core.

For **Lift Manufacturers** and **Installers**, Corefast's accuracy facilitates faster fixings and less remedial work on-site.

**Above:** Corefast core details



## A faster, stronger and more efficient method of constructing building cores.

### Commercial

*Forty Springgardens* is a prestigious office scheme in the financial heart of Manchester - a nine-storey structure with two basement storeys below ground. Corefast was specified for the central four-bank lift core and an additional lift/stair core, chosen in preference to alternative construction techniques. Corefast was ideal for this busy inner city site - modules were delivered just-in-time, reducing site congestion, and increasing speed of construction.

The first Corefast project to be undertaken in the City of London is at *One Basinghall Avenue*. This impressive scheme uses Corefast to provide the central lift core in this 12-storey steel framed structure, located against an existing property with limited access for installation. Corefast was selected as its speed, accuracy, cost effectiveness and contribution to enhanced site safety impressed all members of the construction team.

### Retail / Leisure

Corefast made possible the creation of a stunning, panoramic lift in the foyer of the cinema complex within the vast new *Dundrum Town Centre* development south of Dublin. The technique rose to the challenge of the architect's complex design for an eye-catching, dramatic open fronted lift, which meant that loads had to be carried by only three walls. Corefast's high strength and rigidity enabled the architect's vision to be realised. The six-storey core, which was on the critical path, was installed in five working days, enabling the main contractor to reduce the time spent constructing this part of the scheme.

### Residential

Corefast was specified for a Scottish residential developer's largest-ever project, the exciting *Southgate* scheme in Glasgow, comprising 335 apartments.

In the first phase, consisting of two blocks of six and seven storeys, four Corefast cores were installed and concreted in just seven days. The contractor was particularly impressed by the accuracy and speed delivered by Corefast's off-site component manufacture.

### Student Accommodation

*Birmingham 1* is an impressive student halls of residence scheme in south-west Birmingham. The dramatic 18-storey tower that is the centrepiece of the development uses Corefast to construct the central lift/stair core. In addition to saving six weeks on the construction programme, Bi-Steel's high strength and rigidity meant that the four reinforced concrete cores originally specified could be replaced by a single Corefast core and supplementary conventional vertical bracing.

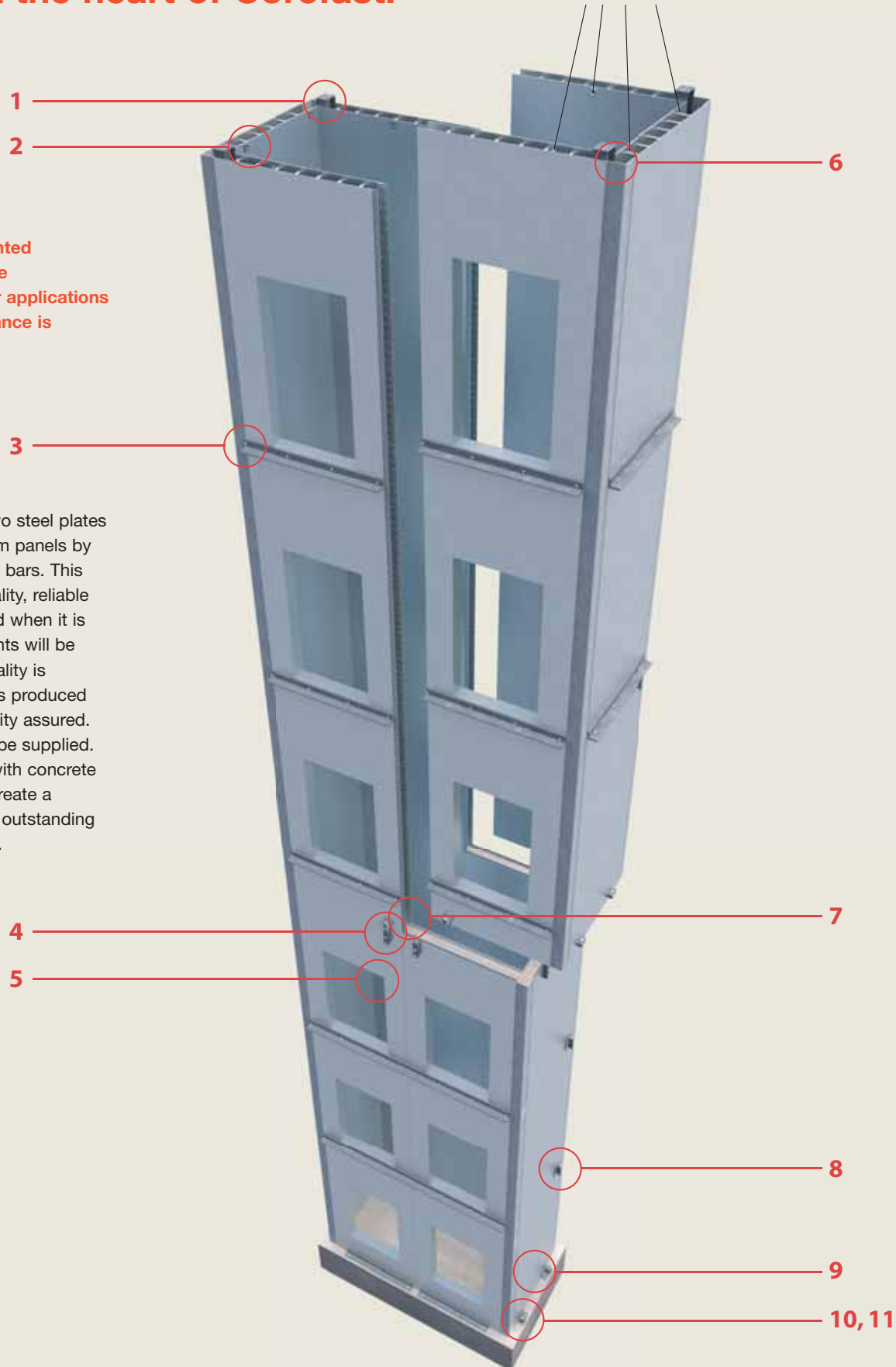
**Above:** Artists' impressions of the completed developments

# How Corefast is created

## Bi-Steel - at the heart of Corefast.

Bi-Steel is a Corus-patented steel/concrete composite construction material for applications where superior performance is required.

The material comprises two steel plates connected together to form panels by an array of friction-welded bars. This process provides high quality, reliable welds and is typically used when it is anticipated that components will be severely loaded. Weld quality is monitored as each panel is produced and all processes are quality assured. Curved or flat panels can be supplied. Bi-Steel panels are filled with concrete once installed on-site to create a construction material with outstanding strength and performance.



# Combining the benefits of steel and concrete in a modern method of building core construction.

Corefast cores are created by combining Bi-Steel panels into modules off-site, transporting them to the construction project site and erecting them to form the core.

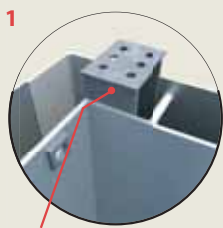
Modules are manufactured by Corus-approved steel fabricators to Bi-Steel specifications. They are typically eight to

12 metres long and weigh in the region of four to six tonnes. This facilitates convenient transportation by road and easy installation by crane on-site.

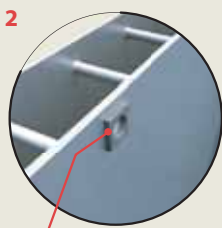
The off-site fabrication can include provision of door, window and service openings plus the fixing of fin plates and floor angles for beam and slab

connections. At this stage connections for lift and stair units can also be included.

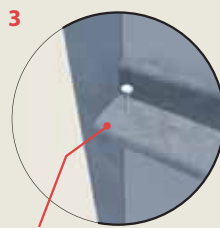
Once erected on-site, the modules are filled with concrete to create the full strength structure.



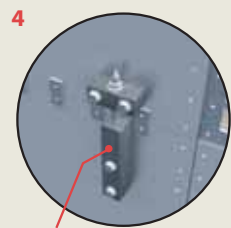
1 Stubs for incoming columns



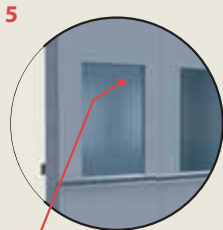
2 Lifting hole with stiffener plate



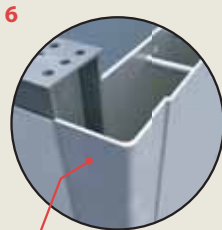
3 Shelf angles with shear studs attached as required



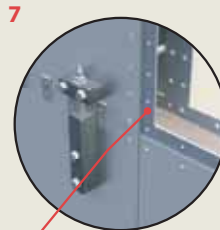
4 Corefast temporary adjuster assemblies allow vertical adjustment of Bi-Steel modules



5 Door opening with 8mm closure plates to all faces



6 Pressed angle welded to 2 Bi-Steel panels to form corner module



7 Modules are bolted together using splice plates



8 Welded T-fin plate (standard fin plates can also be used)



9 Rebar set into foundation (by others), centred between Bi-Steel connecting bars



10 Adjuster blocks provide vertical tolerance at foundation level



11 Angle welded to Bi-Steel panel to accept temporary holding down bolts cast into the foundation



Once erected on-site, the Bi-Steel panels are filled with C40 grade pump-able mix concrete



# Fast, accurate installation on-site

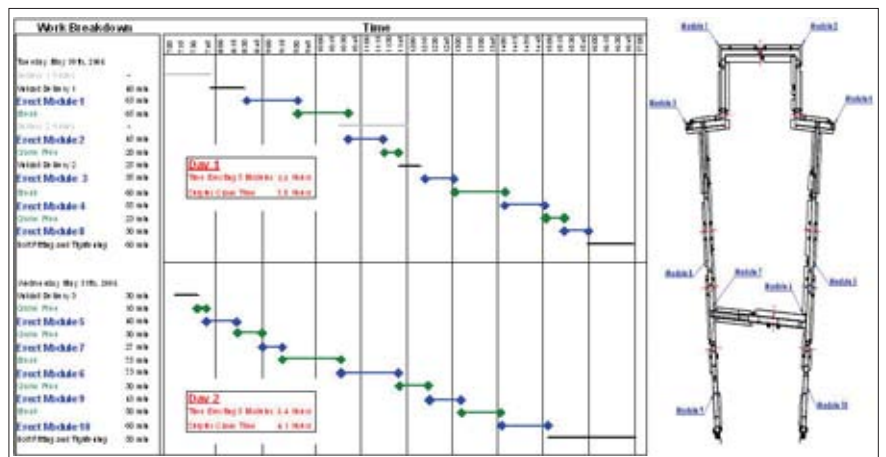
The advantages of Corefast will be immediately obvious to the site team when erection of the Corefast core commences.

The Bi-Steel panels or modules are delivered to the site on a 'just-in-time' basis; minimising the lay down area, reducing congestion and enhancing site efficiency.

Speed of installation is impressive, preliminaries are reduced, temporary formwork is eliminated and safety is enhanced. Also, because Corefast can be installed so rapidly, erection of steelwork can take place earlier and follow on trades can move onto site sooner.

Typically a Corefast core can be erected up to six times faster than an equivalent concrete core and, importantly, to a flexible programme.

In addition, environmental impacts are lowered due to a reduction in site assembly operations and vehicle movements.



**Above:** Installation of each 166m<sup>2</sup> 2-storey section of Corefast core at Birmingham 1 took place over 2 days



### Foundation connections

Bi-Steel modules or panels are craned into position over pre-prepared foundations to which they are temporarily attached with holding down bolts.

There are a number of simple systems that can be used to connect Corefast structures to the foundation. For example, the Corefast modules can be lowered over starter bars projecting from a traditional concrete foundation. Alternatively, permanent holding down bolts are cast into the foundation to mate with brackets attached to the Corefast module.



### Erecting Bi-Steel modules on-site

Erecting Bi-Steel is a straightforward process that can be undertaken by a steelwork contractor using a standard site crane. Panels can be erected individually to create the core, or they can be connected together off-site to form modules and then erected. Typical modules weigh about four to six tonnes.

There are several options for connecting Bi-Steel panels together on-site, including welding and bolting.



For relatively low-level cores - four to six storeys - the core can be constructed in isolation. As build heights increase it is more common to construct the core in tandem with the rest of the frame of the building - typically in two-storey sections.

### Accuracy - steel to steel connections

High levels of accuracy are a feature of Corefast, both in the manufacture of the panels and modules, and when site assembly takes place.



Modules can be easily re-levelled and aligned at every lift ensuring the structure remains plumb as the build progresses. This makes the steelwork contractor's job easier when it comes to connecting the main framing beams to the Corefast core, which can be either bolted or welded using conventional fin plates. Angles pre-connected directly to the Bi-Steel faceplates accept the slab connection.



Connecting steel to steel is much simpler than connecting steel to alternative materials and brings the benefits of 'one trade working'.

### Concrete filling

Concrete filling takes place in pre-defined rises, dependent on the number of storeys, to give the structure its full design strength.

Typically, a C40 grade pump-able mix concrete is used to fill the Bi-Steel panels using conventional equipment such as a tremie pipe. The use of self-compacting concrete means concrete vibration is not required.

Bi-Steel is designed for concrete filling, with vent holes provided where necessary to ensure air or water does not get trapped within the panels. Concrete filling of the Corefast modules can generally proceed at a rate of two to three metres height per hour.

Bi-Steel's construction methodology ensures that panel-to-panel and panel-to-interface connections are generally grout-tight. Concrete cracking issues are eliminated as the steel plates prevent drying out, leaving the concrete moisture-rich.

### Fire protection

Bi-Steel has a tested fire resistance of 30 minutes. For general applications, higher levels of fire resistance can be achieved for cores by a number of means including:

- Calculation to demonstrate actual fire resistance on a project by project basis – up to one hour
- Up-grading the dry lining system normally used to achieve the required fire resistance
- Use of intumescent paints

### Left:

Corefast foundation connections  
Corefast foundation holding down bolts  
Corefast installation on site  
Corefast connection to the building frame  
Concrete filling of a Corefast core

# Bi-Steel - profit from our experience

## Unrivalled technical expertise

Bi-Steel's design and engineering team has many years of experience designing structures and providing engineering solutions for the most challenging projects.

We fully understand the needs of clients, architects, engineers and contractors and work closely with them to ensure projects are delivered on time and to the agreed specification.

## Project management

Corus can assist in the project management of the installation of the Corefast core.

All members of our engineering team have expertise in every aspect of Corefast erection having worked on varying types of schemes throughout the UK.



**Left and right:** Bi-Steel's technical, design and delivery teams provide total construction solutions

**Right:** Corus manufacturing facilities operate to world-class standards  
**Far right:** Bi-Steel engineers are experienced in all aspects of Corefast installation



### Quality and integrity

Corus is one of the UK's leading companies. With world-class manufacturing facilities, we use the latest technology to ensure our product offerings are state-of-the-art.

All our products are manufactured to the highest quality and are thoroughly tested and proven in action.

Backed by an unrivalled reputation, Corus is in a unique position to provide value in steel to our clients by delivering solutions that make construction projects safer, cost effective and more efficient.

### Contact us

For the latest information on Corefast call us on +44 (0) 1344 751670.



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[www.corusconstruction.com/bi-steel](http://www.corusconstruction.com/bi-steel)

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**Corus Bi-Steel**

Crowthorne Enterprise Centre  
Old Wokingham Road  
Crowthorne  
Berkshire RG45 6AW  
United Kingdom  
T +44 (0) 1344 751670  
F +44 (0) 1344 751671  
E [bi-steel@corusgroup.com](mailto:bi-steel@corusgroup.com)

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