

# The Merits of Structural Steelwork



**BCSA**

## The Purpose of this Reference Manual

- The guide, which has been prepared by BCSA, should be used in discussions with clients and their representatives: developers, architects, consulting engineers, surveyors etc.
- The guide is designed to help specify the requirements of clients and then demonstrate what steel construction has to offer in meeting these requirements.



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## Who is the Client?

### Who has to be convinced about the advantages of steelwork?

Who should be advised of the advantages of steelwork?	When does knowledge of the advantages of steelwork play a role?	How do the clients receive the message?	
		Directly: from the steelwork contractor	Indirectly: from Trade, Technical or Producer Organisations, eg BCSA, Corus, SCI, TWI, ECCS
<ul style="list-style-type: none"><li>• The Client or Developer</li><li>• The Architect and the Engineer</li><li>• The Surveyor and the Construction Manager</li><li>• The Financial Adviser to the Client or Developer</li></ul>	<ul style="list-style-type: none"><li>• In the development of ideas</li><li>• At the initial stages of the project</li><li>• Comparing steelwork with other framing materials</li><li>• When costing alternative schemes</li><li>• During the design</li></ul>	<ul style="list-style-type: none"><li>• Exchanging ideas through personal contact</li><li>• Advice given or received at the planning stage</li><li>• Budget Pricing</li><li>• Documentation</li><li>• During Contracts</li><li>• Socially</li></ul>	<ul style="list-style-type: none"><li>• Conferences</li><li>• Seminars</li><li>• Courses</li><li>• Publications</li><li>• Documentation</li><li>• Advertisements</li><li>• Press Articles</li><li>• Exhibitions</li><li>• Press Conferences</li><li>• Websites</li></ul>

## What does the Client want?

Value for Money	Flexibility	Speed	Safety
<ul style="list-style-type: none"><li>• An economic construction material.</li><li>• Continuous development in technology.</li><li>• Built in a short construction period.</li><li>• Savings throughout the whole project.</li></ul>	<ul style="list-style-type: none"><li>• In design.</li><li>• During construction.</li><li>• In use.</li></ul>	<ul style="list-style-type: none"><li>• Pre-engineered solutions.</li><li>• Short construction period.</li></ul>	<ul style="list-style-type: none"><li>• During design and fabrication.</li><li>• During construction.</li></ul>

Quality and Reliability	Professional Approach	Sustainability	Prestige
<ul style="list-style-type: none"><li>• During the design process.</li><li>• During construction.</li><li>• Relating to costs.</li><li>• After occupation.</li></ul>	<ul style="list-style-type: none"><li>• Competent and responsible contractors.</li><li>• Advice and support</li><li>• Integrated electronic transfer of information.</li></ul>	<ul style="list-style-type: none"><li>• At the construction stage.</li><li>• After completion.</li><li>• Environmentally friendly.</li></ul>	<ul style="list-style-type: none"><li>• Aesthetically pleasing</li><li>• A structure that reflects the client's ambitions.</li></ul>

## What the Client wants?

### How steel helps to achieve this:

#### Value for Money

##### **AN ECONOMIC CONSTRUCTION MATERIAL**

- Increased productivity in steel manufacture and design, fabrication and erection have made steel a low cost way of building.
- New low cost approaches to fire and corrosion protection are available.
- Costs have fallen in real terms.

##### **CONTINUOUS DEVELOPMENT IN TECHNOLOGY**

- By investment in IT and CAD/CAM technology for engineering and production.

##### **A SHORT CONSTRUCTION PERIOD**

- Earlier possession of the building for use or rent.
- Lower financing costs.
- Better site utilisation.
- Earlier access for following trades.

##### **SAVINGS THROUGHOUT THE WHOLE PROJECT**

- Early involvement of the steelwork contractor in the design process.
- Large unsupported spans.
- Smaller site footprint.
- A durable form of construction which meets the building life requirements.
- Slender columns resulting in maximising floor area.
- An excellent strength to weight ratio so lower foundation costs.
- Offsite fabrication and lower site costs during construction.
- Prefabricated therefore greater independence from the weather.
- Low cost and efficient approaches to fire protection.
- Easy integration of services.
- Great flexibility in accommodating changes to the building.

## What the Client wants?

### How steel helps to achieve this:

#### Flexibility

##### IN DESIGN

- IT and software.
- Steel's excellent strength to weight ratio creates an attractive and economic use of space when beams and columns have small profile areas.
- New rolled and prefabricated section shapes.
- Economic methods for shaping and curving.
- Standardised solutions for floor systems and connections.
- Opportunities to integrate large openings, for doors and windows
- Fire engineering.

##### DURING CONSTRUCTION

- Complementary structural components can easily be accommodated - curtain walling readily and efficiently connected to the structure, and other modularised elements such as toilet pods, dry-casing, M&E items easily fitted.
- Easy adaptation - during the construction period the client may wish to alter installations and this can readily and rapidly be achieved.
- Steelwork connections, particularly bolted ones, can easily be released or re-made in whatever form necessary.

##### IN USE

- The client may need to extend, to change the use of the building, to absorb changes in loading requirements, and to incorporate new installations.
- Should an increase in loading requirements occur, then the structural elements can easily be individually strengthened, or additional members introduced or altered to suit.
- Steel's relative lightness in weight allows adaptation in the future to be easily accomplished.
- New connections can easily be introduced by bolting or welding - enabling alterations for services or changes of use.

## What the Client wants?

### How steel helps to achieve this:

Speed	<p><b>PRE-ENGINEERED SOLUTIONS</b></p> <ul style="list-style-type: none"><li>• The construction preparatory phase enables the structure to be planned and connections to be selected for speed of erection.</li><li>• Just-in-Time manufacturing techniques.</li><li>• The steel frame is designed and manufactured from computer models directly linked to the CNC machines thus ensuring high dimensional accuracy and speed of erection.</li><li>• Quick drying coatings technologies.</li></ul> <p><b>SHORT CONSTRUCTION PERIOD</b></p> <ul style="list-style-type: none"><li>• Economical foundations - steel's excellent strength to weight qualities result in small foundations which then take minimum time to construct.</li><li>• Off-site manufactured elements - ready for immediate erection upon arrival on site, with no subsequent delays. This means following trades can carry out their work in parallel.</li><li>• New erection techniques, eg use of mobile working platforms.</li></ul>
Safety	<p><b>DURING DESIGN AND FABRICATION</b></p> <ul style="list-style-type: none"><li>• Extensive research and development by the steel construction industry into accident prevention.</li><li>• Wide ranging Health and Safety guidance documents and procedures.</li></ul> <p><b>DURING CONSTRUCTION</b></p> <ul style="list-style-type: none"><li>• Off-site manufacture means less site activity.</li><li>• Regulatory monitoring of machinery.</li><li>• Risk assessments.</li><li>• Use of mobile elevating working platforms.</li></ul>

## What the Client wants?

### How steel helps to achieve this:

#### Quality and Reliability

##### **DURING THE DESIGN PROCESS**

- World Class companies using tried and tested solutions.
- Steel is a homogenous material and is subject to documented quality control procedures during manufacture and rolling. The Client can be assured of obtaining reliable and constant quality.
- A wide range of section shapes and sizes in a range of qualities offers the most efficient and economic solution for the design requirements.
- Successful use of IT.

##### **DURING CONSTRUCTION**

- A qualified and trained workforce - in the fabrication shops staff are permanently employed, often for the whole of their working lives, and on site erection companies maintain a permanently employed labour force.
- Independent Certification of in-house quality systems gives ongoing assurance of procedures and products.
- Improved coatings technologies.
- High quality surface finishes available for pre-site approval.
- Bolted and welded connections are generally exposed and therefore are simple to check for quality and safety.

##### **RELATING TO COSTS**

- Costs are predictable, which helps with a meaningful calculation of the investment and risk involved in the project.

##### **AFTER OCCUPATION**

- The steel frame is visible for ongoing inspection.
- The plastic behaviour of steel provides additional security in extreme loading situations, such as explosion, impact, terrorist attack and earthquake.

## What the Client wants?

### How steel helps to achieve this:

#### Professional Approach

##### **COMPETENT AND RESPONSIBLE CONTRACTORS**

- The steel construction industry can give assistance to the client and his professional team with technical and budgetary advice at the planning stage of the project.
- Industry standard details in design and connections offer economy in construction.
- Full design can be carried out where required by the steelwork contractor.
- Greater co-operation within the project team through partnering and the consequent improved payment profile result in benefits for all.

##### **ADVICE AND SUPPORT**

- The industry's advisory organisations can help the client and his team on all aspects of the design, costing, procurement, fabrication and erection process.
- The Register of Qualified Steelwork Contractors enables clients to select independently audited companies appropriate to the project.
- The National Structural Steelwork Specification can be relied upon to provide industry accepted standards.
- Continual R&D in areas such as fire design, seismic resistance, health and safety, etc provide the client with safe structures and a dynamic industry.

##### **INTEGRATED ELECTRONIC TRANSFER OF INFORMATION**

- The industry uses software for all aspects of its processes and engineering modelling tools enable the client and his professional team to interface directly with the steelwork contractor.

## What the Client wants?

### How steel helps to achieve this:

#### Sustainability

##### **AT THE CONSTRUCTION STAGE**

- Delivery of steelwork is relatively straightforward - requiring little space, time or inconvenience. The hours of delivery can be selected in order to reduce public nuisance.
- Because steelwork comprises prefabricated elements, there is as a result less site disruption with adjoining properties.
- Construction equipment normally used to erect steelwork is cranes and mobile platforms. These by their nature require little permanent or temporary space to operate.
- Noise when manufacturing, delivering or erecting steelwork is not a major problem.
- The speed of steelwork erection means inconvenience caused is reduced to a minimum period.

##### **AFTER COMPLETION**

- Steel can be easily maintained so that colour and appearance can always be made to suit a constant or changing environment.
- Coatings developed through new technology last longer.

##### **ENVIRONMENTALLY FRIENDLY**

- Steel is basically a clean, user-friendly material - no dust, no spillage, little waste etc - and consequently no equipment employed to counteract such problems.
- Steel can be reused, relocated or recycled once its use has been overtaken by events. Use is therefore responsible in environmental terms.

## What the Client wants?

### How steel helps to achieve this:

#### Prestige

##### **AESTHETICALLY PLEASING**

Steel by its very nature has:

- Clean lines
  - Slenderness
  - Large spanning
  - Architectural possibilities
- It appeals to the client and his designer in terms of attractiveness as well as economy.
  - Colour, through paint, can easily and economically transform a building to satisfy the designer's options.

##### **A STRUCTURE THAT REFLECTS THE CLIENT'S AMBITIONS**

- Steel has exhibited consistently great architectural beauty - suspension bridges, tall towers and high buildings, for example, the world over are magnets for tourism. Many steel structures worldwide are viewed as amongst the greatest achievements of mankind.

