

SEPTEMBER 2022

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**Cover Image**  
**Kingston Park, Peterborough**  
Client: Firethorn Trust  
Architect: UMC Architects  
Main contractor: Glencar Construction  
Structural engineer: JPP Consulting  
Steelwork contractor: Caunton Engineering  
Steel tonnage: 1,700t

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Shortlisted for innovation in the 2022 British Construction Industry Awards and Construction News Specialists Awards.



# Steel stays committed to achieving net-zero carbon



Nick Barrett - Editor

The UK has been a leader internationally in committing itself to carbon reduction targets and was hailed in 2019 for introducing a legally binding target of net-zero carbon by 2050. Since then, others have passed laws designed to achieve net-zero by 2050, including Japan, Canada, Korea and New Zealand, and the UK has further committed to interim targets to reduce emissions by 78% by 2035.

Recent heatwaves and drought conditions across Europe have heightened the sense that the planet could be in the last chance saloon to prevent global temperatures rising to unsustainable levels that would make some places virtually uninhabitable, turn once fertile areas into desert and flood others as sea levels rise. At the same time economic and political pressures on governments have led some to question whether net-zero by 2050 is achievable.

Nobody could have expected the path to net-zero would be smooth, with much depending on anticipated, albeit realistic, developments in technology and continuing political commitment. The latter factor is crucial because initiatives introduced to reduce carbon emissions will have to be paid for, and central governments will have to shoulder the burden of raising most of the money.

Several recent developments have raised the question of whether carbon reduction will be shelved for a number of years as the world deals with supply chain issues, inflation, possible recession and the fallout of Russia's invasion of Ukraine and other factors that have driven up energy prices. BCSA President Mark Denham makes the very good point in his column in this issue of NSC that basic industries that the world depends on to make modern civilisation possible - like steel - will need government support if they are to be able to survive, let alone pay for the high investments needed for initiatives that will 'green' the steel supply chain.

All along the steel supply chain however we can see evidence that the resolve of the industry to play its essential role in the climate change battle is undiminished. In News this month we have a story from British Steel that it has followed up publication of a Low Carbon Roadmap that sets out the decarbonisation challenge it faces, reveals the targets it has set itself and how it intends to achieve them, with a Pocket Guide that summarises the journey this major steel manufacturer has already embarked on.

Other steel manufacturers supplying the UK market have also adopted policies designed to support the government's net-zero carbon drive. Steelwork contractors and others in construction teams are committed to playing their part. Across the UK steel-framed structures of all types are achieving BREEAM 'Excellent' ratings and previously constructed buildings are being designed to achieve net-zero after being repurposed.

New regulations that could cut emissions from buildings by up to 80% from 2020 levels are expected by 2025, and steel buildings can confidently be predicted to be among the first to show how this can be done. The BCSA will shortly produce a revised Sustainability Charter to allow members to demonstrate their commitment, and existing carbon measurement tools are being refined. Despite the current setbacks and worries, the constructional steelwork sector remains committed to achieving net-zero carbon.



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# Updated Commentary of NSSS 7th edition now available

The British Constructional Steelwork Association (BCSA) has published the 3rd edition of the Commentary on the National Structural Steelwork Specification for Building Construction 7th edition (NSSS).

The Commentary has been prepared to give guidance and additional information on the background and philosophy behind the recommendations given in the NSSS.

The changes to the 7th edition of the NSSS are also reflected in the new Commentary which gives additional information and guidance on the following topics:

- The references to British Standards (issued with BS, BS EN, BS EN ISO or BS ISO references) have been updated.
- Section 5 – Workmanship. The Steelwork contractor's welding quality management system shall be certified

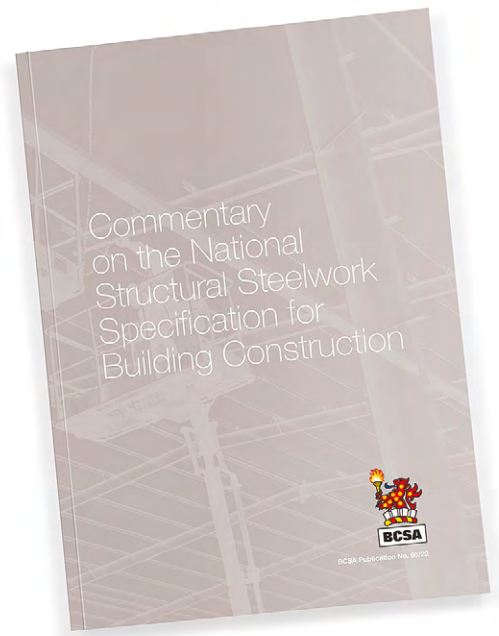
to the standard quality requirements described in BS EN ISO 3834-3 for Execution Class 2.

- Section 10 – Protective treatment (corrosion and fire). This section has been extensively modified and includes updated requirements for corrosion protection systems and new clauses on the specification, application and testing of intumescent coatings.
- Section 11 – Quality management. This section requires steelwork contractors to have all the necessary facilities, skills and effective quality management to ensure that their services and products conform to the NSSS. It stipulates that the quality management system shall be open to assessment by the Employer or be certified by an approved certification body for compliance with BS EN ISO 9001. In addition, it

stipulates that the manufacturer's factory production control system shall be certified by an Approved Body for compliance with BS EN 1090-1.

BCSA Director of Engineering Dr Ana Girao Coelho said: "The Commentary was first drafted by Richard Stainsby and Roger Pope, and has now been updated by Dr David Moore and myself and reviewed by the NSSS Steering Committee."

Hard copies of the 3rd edition of the Commentary on the NSSS (BCSA Pub.



No. 66/22) can be obtained from: <https://steelconstruction.org/product/nsss-commentary-2022/>

Copies are priced at £48 for BCSA members and £60 for non-members.

## Steelwork contractor receives governmental visit



Dr Caroline Johnson MP for Sleaford and North Hykeham and Minister for Education (at the time of writing), has recently visited Shipley Structures.

Wendy Coney, Executive Chairman of Shipley Structures, welcomed Dr Johnson and gave an overview of the company and its capabilities.

The local MP was keen to hear about the number of locally employed staff and about such a thriving business, producing structural steelwork for buildings all across the UK, that she had no idea was right under her nose!

Wendy Coney commented: "It is encouraging to have a visit from our local MP and to be able to demonstrate the thriving industry within the constituency.

"The BCSA is working hard with government to improve the opportunities for manufacturing in the country and it is good to be able to demonstrate our abilities first hand to our elected MP."

Dr Johnson MP said: "While touring the site we spoke about the impressive and notable projects they have worked on, recruitment into manually skilled jobs, the upskilling of employees as technology develops and the ways in which the business is adapting to make sure they are as efficient and effective as possible.

"I was particularly impressed by the pride they take in their practical work, and their desire to continue supporting and training staff as technology and processes develop."

## Contract awarded for Farnborough Airport hangar

McLaughlin & Harvey has won the contract to design and build a new hangar at Farnborough Airport.

Representing the largest infrastructure project at the airport this century, work is due to start in the coming weeks while the facility remains fully operational.

McLaughlin & Harvey Construction Director, Douglas McCusker, commented, "We are proud to have been selected as design and build partner for the construction of the new hangar facilities.

"We will draw on our previous experience of working in a live airport environment, to ensure that construction doesn't impact the day-to-day activities at Farnborough Airport."

The development at the airport - named Europe's best Fixed-Based Operator (FBO) since 2005 - will increase the hangar space available to clients with the construction of an additional large span steel portal building with high specification concrete floors, associated airport apron works and hangar doors.





# Record revenues posted by steelwork contractor

Taziker Industrial, the multi-disciplined engineering specialist, has posted record revenues for the financial year to 31st March 2022.

Trading in the year was up more than 30% on the previous year, to in excess of £73M. The company said the business has continued to successfully develop, expand, and diversify into new markets.

The increased volumes generated a gross profit increase, up by £3.5M to £15.5M, with gross profit percentage

also improving as the business enhanced its operational performance and took advantage of the increased volumes.

Operating profit in the year improved by more than £2M to £3.8M, generating a pre-tax profit of more than £5m.

The business also said that it started the new financial year with a record secured order book in excess of £82M, which is an increase of more than 40% on the previous year.

Steve Corcoran, Chief Executive



of Taziker (pictured) said: "We are extremely pleased to announce these positive results, which were attained during a period of turmoil and disruption caused by the COVID-19 pandemic."

# Steel completes on diagrid landmark office scheme

Structural steelwork has been completed on Four New Bailey, a 10-storey office development in Salford, which has been let to telecommunications giant BT as its new regional hub.

Designed by Make Architects, the building features a lattice diagrid steel frame, said to be influenced by the Victorian infrastructure and bridges along the adjacent River Irwell.

According to Make, BT's team will benefit from exceptional communal facilities throughout the building that support colleague wellbeing, right up to the rooftop terrace where they will be able to enjoy panoramic views across the city.

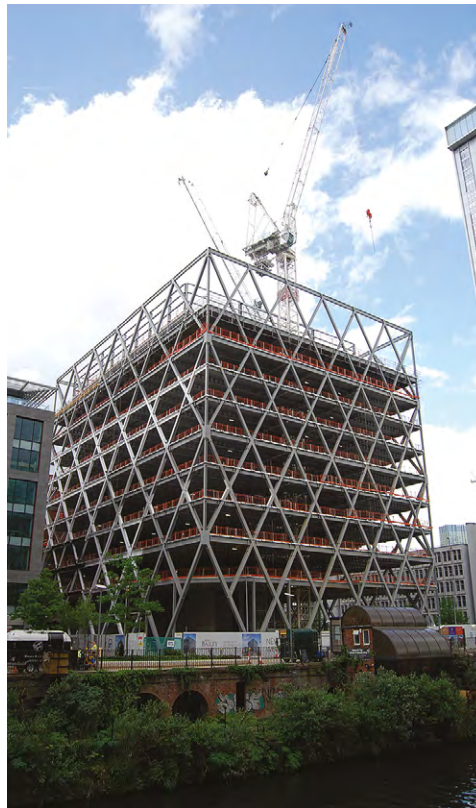
Working on behalf of main contractor Bowmer + Kirkland, Billington Structures fabricated, supplied and erected 1,100t of steel for the project.

Aiming to achieve a BREEAM 'Outstanding' rating, the building will provide 16,250m<sup>2</sup> of Grade A office space.

The steel frame is founded on piled foundations and gains its stability from a combination of the main centrally-positioned concrete core, the diaphragm action of the floor slabs and the stiffness of the diagrid.

With minimal internal columns, long span cellular beams, up to 15m-long, create open-plan floorplates, accommodate the building's services within their depth and support a metal decked composite flooring solution.

Four New Bailey is due to complete by the end of the year.



# Nottingham Forest receive approval for stadium expansion



Premier League new boys Nottingham Forest, have received planning permission to rebuild the Peter Taylor stand, which will double its capacity to 10,000, taking the overall number of seats at the City Ground to 35,000.

In a statement, the club said it was delighted with the decision of the Rushcliffe Borough Council Planning Committee to uphold the recommendation of its Planning Officers that the club's application to redevelop the stand should be approved.

"The decision represents a significant landmark in the journey to redevelop the historic City Ground site and represents the culmination of three years of dedicated work by the club and its advisers," a spokesperson said.

The club's intention is to complete the rebuilding by the end of the 2023/24 season, with the possibility that the lower tier of the stand could be operational earlier. In total, it is estimated the redevelopment will cost more than £94M.

## NEWS IN BRIEF

**West Lothian Council** has granted planning permission in principal for a new 11,000m<sup>2</sup> film studio to be created in Bathgate, next to the existing Pyramids Business Park.

**BAM** has been appointed through the Department for Education's (DfE) high value framework to redevelop Fred Longworth High School in Wigan, Greater Manchester. The £24M contract will see the contractor create a three-storey teaching block, which will be net-zero carbon in operation.

**Morris Leslie Group** has secured planning permission for a £33.8M leisure-led development at West Kinfauns, Perthshire, which will include an hotel with up to 150 rooms, holiday chalets, a transport museum and retail units.

Belgium-based real estate group **Atenor** has submitted plans for the redevelopment of the 1950s-built seven-storey Fleet House in the City of London. Architect HOK has designed the building's redevelopment, which retains 80% of the existing structure and features a planted façade.

Main contractor **Kier** will start work this autumn on the UK's newest smart prison, a facility that will have over 1,400 modern places to get more offenders into jobs and away from crime. It is claimed the £400M prison in East Yorkshire will include an unprecedented array of workshops and classrooms, so prisoners spend their time learning new skills to help them find work on release.

**Sefton Council** has submitted plans for The Marine Lake Events Centre on Southport waterfront. Aiming to achieve a BREEAM 'Excellent' rating, the scheme will be centred around a 1,200-seater first-class events space.



## PRESIDENT'S COLUMN

At a recent BCSA meeting some members thought I was a little bit grumpy. Thinking about that after the meeting, with inflation running at 10% or more, energy prices going through the roof, the continued crisis in



the Ukraine, a paralysed UK government and many other things we have to contend with on a daily basis, is anybody really surprised that people might be down in the dumps? Often though, when we start to feel sorry for ourselves, events happen to other poor souls that are so grave, that some of our day-to-day problems are not really that bad and it gives us the energy to keep going. Feeling over positive however, when conditions don't warrant that, can also be detrimental sometimes. I refer to Jim Collins' book "Good to Great", where he discusses the time that Admiral Jim Stockdale was a POW from 1965 to 1973 in Vietnam. Stockdale was confined in what can only be described as grim conditions. Stockdale discusses the "optimists" in the camp, the ones that thought they were going to get released by Christmas or Easter. Unfortunately, these milestone dates came and went, and they were all still incarcerated. One by one the "optimists" died of a broken heart. Stockdale was quoted as saying, "You must never confuse faith that you will prevail in the end - which you can never afford to lose - with the discipline to confront the most brutal facts of your current reality, whatever they might be", the message to his men being, "we're not getting out by Christmas; deal with it!"

The message that I take out of the "Stockdale Paradox" is there are a lot of things we can't control. Steel prices, availability of steel and energy prices are perhaps the most obvious. The BCSA and the larger BCSA steelwork contractors continue to hammer home the message that continued increases in the price of steel with no warning is detrimental for all parties in the long run. Despite this, the decision makers do not hear, or simply disregard the message and we all have to deal with the consequences. What the BCSA is doing at government level is making them aware that the "steel industry" is not just the steel mills, there are many more people working in the industry, designing, detailing, fabricating, treating and erecting the steel and many others in the supply chain.

One of those steel mills here in the UK, British Steel, has just published their "Low-Carbon Roadmap, A pocket guide, which details their decarbonisation targets and plan to achieve net-zero by 2050. Their plan seems to tick all of the boxes, but I see two potential problems. Firstly, they will need time to change, but clients want change immediately and are specifying EAF steel now in lieu of allowing the steelwork contractor to make the choice - even though we all know that if one customer specifies EAF, another customer will be getting BOS steel; the world is no better off as there simply is not enough EAF steel to go around. Secondly, it states, "All our targets are achievable but will need appropriate government policy and framework support to facilitate it." Let's hope for understanding, patience and support from both clients and government during their journey to net-zero.

**Mark Denham**  
BCSA President

## Steel projects star at Tekla Awards

Software provider Trimble has announced the winners of its Tekla Awards 2022, which are open to users of Trimble's Tekla Structures and Tekla Structural Designer software.

The Awards serve to recognise and celebrate the hard work and achievements of those working within the BIM and construction industry.

The Awards are open to projects of all shapes, sizes and complexity and showcase structures modelled using Tekla software within the UK and Ireland.

Steel-framed projects dominated the Awards again this year, with Kings Cross R8 (pictured) winning the Commercial Project. Erected by Severfield, on behalf of main contractor McLaren Construction, this twin 13-storey project was designed by Arup.

The Industrial Project was won by Newhurst EFW facility, which was erected by Billington Structures, while the Infrastructure Project category was awarded to S H Structures' Stockingfield footbridge.

As the Commonwealth Games are currently underway in Birmingham, it was apt that the Sports & Recreation Project award went to BHC's Alexander Stadium redevelopment. Meanwhile, in Manchester,



William Hare's The Factory won the Public Project category.

The Tekla Awards are open to all sizes of jobs, and the Small Project was awarded to the Hydro Ness scheme in Inverness. The steelwork for this job was erected by M Hasson & Sons.

Steve Insley, Business Director at Trimble Solutions, said: "Every year, we're all blown away by the standard of entries received into the Tekla Awards and 2022 has been no different. It always amazes me to see the expertise and innovation possessed by our brilliant customers and how our software has been used to help bring some truly incredible structures and transformational infrastructure to life."

## Steelwork contractor joins CO2nstructZero



William Hare has been selected as a CO2nstructZero business champion and is said to be the first steelwork contractor to join over 80 other companies taking action on the climate emergency.

CO2nstructZero brings businesses together from across the sector to motivate the change needed for the construction industry to reduce carbon. As business champions, William Hare joins the platform to share best practice and innovation opportunities in order to create a more sustainable future.

William Hare Environment & Sustainability Manager

Katie Atherton said: "Our people are constantly looking for innovative ways to reduce carbon and believe collaboration is key. We are looking forward to exploring relationships and seeking out opportunities with other business champions.

"This commitment, along with our Science Based Target (SBTi) makes us accountable for our statements and supports our roadmap, which will be published by the end of this year.

"Our work towards the SBTi has allowed us to examine our business and operations in more detail, giving rise to exciting new initiatives to further reduce our carbon past the 49.67% reduction already made against the 2010 benchmark."

## Shortlist announced for first Rolls-Royce SMR factory

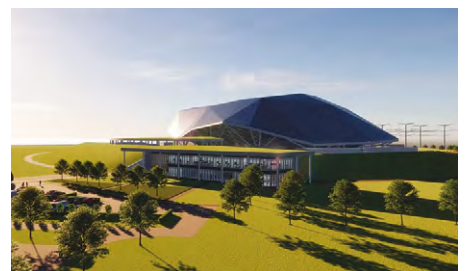
Rolls-Royce has announced a list of potential locations for its first small modular reactor (SMR) factory in the UK.

The factory will be the first of three and will be responsible for the manufacture of the heavy vessels for the company's SMR power plant.

Rolls-Royce said the planned factory will be the largest and most complex facility of the three and construction will begin once it receives the go-ahead to build a fleet of SMRs in the UK.

The shortlist was picked from over 100 submissions and chosen sites are: Sunderland, Richmond in North Yorkshire, Deeside in Wales, Ferrybridge in Yorkshire, Lincolnshire and Carlisle.

The other two factories will manufacture civils



modules and mechanical electrical and plumbing (MEP) modules.

The components will be transported to sites and assembled into a nuclear power station that will generate 470 MW of low-carbon electricity. Each of the initial run of reactors is expected to enough capacity to power the equivalent of 1.3 million UK homes.

The Rolls-Royce SMR programme is forecast to create 40,000 regional UK jobs by 2050 and generate £52bn in economic benefit. The compact design of the SMRs is said to increase site flexibility and maximises potential plant locations, including replacement for existing coal or gas-fired plants.



# Lindapter Hollo-Bolt plug-in tool available in Tekla warehouse



Working in partnership with Trimble Solutions (UK), Lindapter has launched a new Tekla plug-in tool, which it said will help to facilitate the efficient and accurate detailing of its Hollo-Bolt system into structural steelwork models.

Available to download within the

Tekla warehouse, the tool enables Lindapter's system to be incorporated directly into a Tekla user's 3D BIM model in the Tekla Structures software package.

Prior to this product launch, Tekla and Lindapter customers would have had to manually model a generic

steel bolt connection with no specific attributes.

Lindapter Engineering Director Sunny Bansal said: "As a business, we've been wanting to integrate our products into BIM software for a while. As the global industry leader in structural steelwork detailing software, Tekla was the ideal

partner for us to work with to further enhance our digital journey.

"This plug-in tool does exactly that, providing a simplified and improved user experience for fabricators and steel detailers, enabling them to utilise our solutions within Tekla's digital and automated 3D environment."

## Aston Villa plans to increase stadium to over 50,000-capacity

Premier League Aston Villa Football Club has launched a pre-application planning consultation on the first phase of its long-term vision for Villa Park and the

surrounding area.

The club said the plans will pave the way to create a world-class sporting venue, enabling it to compete at the



very highest level. The ambitious plans also set out the club's commitment to the local community, creating a destination that can be enjoyed all-year round.

The first phase of the plans includes a brand-new North Stand connecting into Trinity Stand, and enhancements to the existing Trinity Stand which will see capacity for the stadium increase to over 50,000. The development will also see significant improvements to fan experience through an upgraded food and beverage offering, enhanced hospitality packages, improved connectivity and more.

The plans will also see the

introduction of Villa Live, a brand-new commercial destination venue and community space. Villa Live will be a multi-purpose central 'hub' space, including the club shop, food and drink outlets and areas dedicated to showing the club's rich heritage and history. Aston Villa is asking the local community to help shape the story for Villa Live, from a calming space for new parents, an active area for dance classes to an event space for training and education. The aim is to create a thriving and active community unique to Villa Park.

The first phase of improvements to Villa Park is expected to take place from 2023 through to 2025.

## Planning secured for major Ipswich logistics park

Trebor Developments has secured detailed planning consent for a five-unit industrial and logistics scheme at Eastern Gateway, Ipswich.

The developer said the scheme will provide vital logistics space in the Suffolk town. The units will range from 929m<sup>2</sup> up to 5,100m<sup>2</sup> and will be built on a speculative basis.

Work will commence on site in October and the units will be ready for tenants from May 2023. The project is expected to create approximately 350 jobs for

Ipswich and its surrounds.

Ipswich Borough Council is carrying out further improvements to the wider scheme including new estate roads and access, cycleways, as well as public footpath links which will enhance the offering to future tenants.

Greg Dalton, Development Director for Trebor commented: "Ipswich is a key industrial and logistics hub in the east of England, and we're delighted to have secured detailed planning for this important scheme."



## Diary

For SCI events contact Jane Burrell, tel: 01344 636500 email: [education@steel-sci.com](mailto:education@steel-sci.com) web: <https://portal.steel-sci.com/trainingcalendar.html>



**Tuesday 13 September 2022**

**SCI Tedds Modules:  
Turning SCI Guidance into Designers Tools  
Webinar, SCI/BCSA members only**

This webinar will introduce and demonstrate the first of the newly released SCI add-in modules for the popular 'Tekla Tedds' software. The features of these modules will be illustrated and related to current SCI guidance. The webinar will conclude with a preview of future modules coming soon to the SCI Shop.



**Tue 4, Thu 6, Tue 11 October 2022**

**Light Gauge Steel Design  
Online**

This course introduces the uses and applications of light gauge steel in construction, before explaining in detail the methods employed by Eurocode 3 for designing light gauge steel members in bending and compression and calculation of section properties. Specific design issues related to the different uses of light gauge steel are addressed.



**Tue 18 October 2022**

**Essential Steelwork Design  
Webinar, SCI/BCSA members only**

This webinar will show how hollow sections are structurally efficient, and are often preferred when steelwork with architectural appeal is exposed. Although considered to be more expensive than open sections, there are many circumstances when hollow sections should be specified.



# British Steel publishes a pocket guide Low-Carbon Roadmap



Following on from last year's Low-Carbon Roadmap, British Steel has unveiled a **Pocket Guide** that outlines the decarbonisation challenge that is faced by the steel industry, outlines the targets the company has set itself, and explains how it aims to meet them.

Steel is the world's most **recycled** material, and as an enabling material it provides the basis for others to decarbonise, while

also playing a key role in the transition to a zero-carbon economy.

The UK has set itself an ambitious 78% reduction target on emissions by 2035 from 1990 levels, and it has also set a net-zero target by 2050.

British Steel said by adopting the science-based objectives set out in its Low-Carbon Roadmap – A Pocket Guide, it can reduce its CO2 and meet these targets.

British Steel Commercial Director Ben

Cunliffe said: "We're working towards one of the most significant carbon reduction projects across the UK. It is vitally important we play our part now for the benefit of future generations."

British Steel is already making efforts towards decarbonisation, by producing products such as **weathering steel** structural sections that have an extended life due to a protective oxide layer, and **S460M sections**, which are said to offer increased strength with a lighter weight.

## Kumasi shopping centre taking shape

A **steel-framed** market in Kumasi, Ghana, is quickly taking shape with steelwork from the UK.

UK Export Finance (UKEF) has provided £70.3M of support to develop and modernise the Kumasi Central Market on the requirement that a UK-based company was awarded the contract.

BHC was named as the structural steelwork subcontractor by British firm, Contracta Construction UK, in association with UKEF.

More than 8,000t of steelwork from British Steel has been **fabricated** and shipped to Ghana by BHC, where its onsite team is undertaking the **erection**.

The market will feature 6,500 market spaces to lease, 5,400 cold stores, 800 kiosks, 50 restaurants, 210 stalls for fishmongers and butchers, 40 livestock stalls, a police station, fire station, post office and a hospital.



## Contract awarded for £50M low carbon London office scheme

Main contractor ISG has won the contract to redevelop and refurbish Woolworth House in Marylebone, central London.

The **mixed-use scheme**, for General Projects with Henderson Park, will increase the building's gross floor area

by around 9,290m<sup>2</sup> to over 21,900m<sup>2</sup>. It includes the complete refurbishment of the existing eight-storey office building, located at 242 Marylebone Road in the London Borough of Westminster.

Renamed Metropolis, the new building will benefit from both office and retail facilities, with external green roof terraces across every floor. An events **auditorium**, rooftop-bar, on-site coffee shop, cyclist zone as well as new health and wellbeing amenities complete the specification.

A new extension will significantly increase outdoor and green space, adding new landscaped gardens. To achieve this, the scope of work includes infilling the existing courtyard area up to the seventh

floor, providing tiered planted terraces, while the structure will be extended across floors three to eight using a **steel frame** with cross laminated timber (CLT) floor slabs.

In addition, the existing roof plant enclosures will be removed and consolidated, allowing the creation of rooftop office pavilions on levels five and eight.

Designed by London architect AHMM, the environmental performance of the refurbished building will be boosted to a **BREEAM** rating of 'Outstanding'. Careful retention of existing building material will result in over 4,500 tonnes of carbon saved during the **construction** process and diverted from landfill.





# Galvanizing is the sustainable choice

A combination of long-lasting protection and ease of application makes galvanizing the finish of choice for many industries including construction, manufacturing, and agriculture.



Galvanizing can protect and keep steel maintenance free for more than 70 years.

By its very nature, the **construction** industry has a significant impact on the environment and it is said to account for 36% of worldwide energy usage and 40% of CO<sub>2</sub> emissions. It is no surprise therefore that the introduction of ever-more stringent environmental rules and regulations, as well as the high costs and ethical factors relating to industry, is seeing an increasing number of contractors looking to adopt more environmentally-friendly processes and turning to galvanizing.

At the forefront of the industry, Wedge Group Galvanizing, said to be the largest hot-dip

galvanizing organisation in the UK, has over the past 12 months worked on a diverse range of projects. This includes the refurbishment of one of the busiest heritage railways in the country, the creation of a centrepiece for the new Digital Aviation Research and Technology Centre (DARTEC) at Cranfield University, and the construction of an iconic housing development in Mayfair, central London.

**Hot-dip galvanizing** is the process of coating clean steel with a layer of molten zinc to protect the item from **corrosion** and provide a long-lasting, durable surface. It is more robust than other coatings that only bond chemically or mechanically, and it has the

Construction and many other industries use galvanizing as the sustainable and environmentally-friendly choice for protection against corrosion.



added advantage of fully coating the steel. As a finish, it is not only highly effective, but is also extremely eco-friendly. A single, one-off treatment will coat a product both inside and out, providing a finish which can protect steel and keep it maintenance-free for over 70 years.

This means that the whole life costs of products protected by the hot-dip galvanizing process can be significantly reduced because there is no need for the expense, down-time and inconvenience of repeated on-site maintenance or replacement.

Not only does galvanizing lengthen the lifespan of steel, but it is highly energy-efficient throughout its production and whole lifecycle. The galvanizing process uses minimal resources to ensure a relatively low environmental burden. Zinc's non-ferrous properties mean steel can easily be **recycled** after use, re-galvanized or removed and **reused** elsewhere.

While it has historic roots (it dates back to the mid-1700s), the emergence of new technologies and continuing investment by the industry means that galvanizing is a process that has continually moved with the times.

Developments such as high-velocity 'smart' furnaces, fume extraction units, and heat recovery systems have helped to optimise production and enhance performance, while the introduction of equipment such as inverters has delivered significant savings in power consumption.

And, though the metallurgy has remained largely the same over the centuries, that is now changing too - with the Wedge Group becoming the first galvanizing organisation in the UK to take the ambitious decision to completely remove lead and chrome from its process.

As a company, Wedge Group Galvanizing is leading the way by introducing a number of highly innovative and sophisticated elements to reduce waste, promote better use of resources, and improve energy efficiency. To improve both fuel efficiency and performance, all of its plants use the most innovative pulse-fired high velocity furnace systems, which provide high fuel efficiency, low heat loss, low emission levels and extends the life of the kettle.

Another example of how the company, and the wider industry, is cutting energy consumption is the re-use of 'waste' heat created from the furnaces used in the galvanizing process. All of its plants have been fitted with heat exchanger units that transfer the 'waste' heat generated back into the overall process for use within both the pre-flux and de-grease tanks. The company also has rainwater collection and harvesting systems which recycle rainwater back into the galvanizing process.

With the ongoing efforts being made within the construction industry to ensure that practises and procedures are as environmentally-friendly as possible, and with many subsequently adopting galvanizing as their finish of choice, the process is set to remain a leader in the race for a more sustainable world. ■

Wedge Group  
is a gold sponsor  
of Steel for Life





# Three up with steel



A logistics park in south Peterborough is expanding with the construction of a trio of BREEAM 'Excellent' distribution centres

Accounting for approximately 60% of total activity in the UK structural steelwork market, the single storey industrial buildings sector has been extremely buoyant for the past couple of decades and shows little sign of tailing off.

These buildings have a variety of uses, including workshops, factories and retail outlets to name a few, but the majority are constructed as distribution warehouses, which are commonly referred to as 'sheds'.

Structural steelwork is the favoured framing solution for distribution centre construction, with a market share that exceeds 90%. Steel offers a number of benefits, such as speed of construction and the ability to efficiently create long internal spans, which are so important for

warehousing facilities.

The cost and delivery of distribution centres has been improved considerably in recent times, due in no small part to the efficient use of portal frames by steelwork contractors undertaking a design and build contract.

The advantages of design and build include the fact that a steelwork contractor can quickly and efficiently streamline a distribution centre steel frame.

"We prefer this type of contract as we can use our considerable experience of distribution centres to ensure the steel frame is efficient as possible," says Caunton Engineering Senior Structural Engineer Colin Winter.

An example of this work is Caunton Engineering's project at Kingston Park, Peterborough, where

it has designed, fabricated, supplied and erected three distribution centres on behalf of Glencar Construction.

Purchased by developer Firethorn Trust earlier this year, the 21-acre site is located adjacent to existing occupiers Amazon, IKEA and DART and offers good connectivity as it is within two miles of A1 (M) at junction 17.

Firethorn Trust Development Director Paul Martin says: "We were impressed by Glencar's considerable track record in delivering high-quality facilities of this nature, and we are working closely with the team to bring our vision for Peterborough South to life.

"This highly-specified, net-zero carbon development has been designed to continue driving investment and employment opportunities within

The three new distribution centres will significantly increase the size of Kingston Park.





## FACT FILE

## Kingston Park, Peterborough

Main client: Firethorn Trust

Architect: UMC Architects

Main contractor: Glencar Construction

Structural engineer: JPP Consulting

Steelwork contractor: Caunton Engineering

Steel tonnage: 1,700t



Steelwork erection nears completion on Building 200, which is a three-span portal frame.

what has become one of the UK's fastest growing regions. The scheme will meet the increasing occupier demand for quality, sustainable and flexible logistics spaces."

Creating around 46,450m<sup>2</sup> of logistics space across the three units, the scheme will be delivered to net-zero carbon in construction and is targeting an 'Excellent' BREEAM rating. Sustainable infrastructure will include more than 3,700m<sup>2</sup> of photovoltaic arrays as standard, 48 electric vehicle charging points, and 15% roof lighting.

All three of the buildings are portal frames and have a similar design and concept, albeit they are all different sizes. The largest building on the site, known as Building 300, was also the first structure to be erected. This portal frame consists of four 31m-wide spans and is 168m long.

Like all of the buildings on the site, the columns are founded on piled foundations and the perimeter members are spaced at 8m intervals. Internally, they are arranged in a hit-and-miss configuration, which means there is a column every 16m along the valley lines, creating more open-plan space within the building.

The valley columns represent the heaviest steel elements on the project as they weigh up 3.5t each.

All of the buildings have curved roofs, which have been formed with faceted rafter sections within the spans. Within Building 300's roof, each span required three faceted sections, which were assembled on the ground and then lifted into place as one complete 31m-long section.

One gable end of building 300 has a two-storey office block, with further warehousing space within its ground floor undercroft.

"Each of the three buildings has an office block,



Each of the three buildings has internal office space.

and these areas were the first parts to be erected on each structure as they are the zones of the building with most work for the follow-on trades," says Caunton Engineering Contracts Manager Adrian Downing.

"Once the offices were erected they needed no temporary works before the main frame began, as they were self-supporting because their composite floors and bracings provided stability."

The office blocks are all 10m-wide column-free structures, formed with steel beams supporting metal decking and a concrete topping. Adding some future flexibility to the project, the uppermost level has a composite lid (roof), which could be converted into another office floor. To enable this future-proofing, the building's foundations have been designed with some extra capacity.

Slightly smaller and positioned adjacent to Building 300, Building 200 was the next to be erected. This structure has three 30m-wide spans and is 136m-long. Similar to its larger neighbour, the curved roof spans are also formed with three faceted members. This distribution centre also has a two-storey office block.

The third and smallest structure, known as

*"We prefer this type of design and build contract as we can use our considerable experience of distribution centres to ensure the steel frame is efficient as possible."*

Building 100, is a twin-span portal frame, which is 112m long. Each span is 37m wide and consists of four faceted steel members that create its curved roof.

With more individual steel members required for each span, the erection process for this building's roof was slightly different. Using two mobile cranes, each unit lifted two pre-assembled sections and held them in place, while a central splice was made to complete the entire span.

Building 100 has a one-storey office block, but with the same in-built flexibility, this could be converted into two-storeys if it was required.

The three Kingston Park distribution centres are due to be complete by the end of the year. ■



All of the structures have hit-and-miss internal column arrangements to create more floor space.





# Steelwork stars for Blackpool's big screen

The use of structural steelwork has provided the long spans and flexibility for a nine-screen cinema complex that also accommodates retail and restaurant outlets.

The North West of England is about to get an entertainment boost when one of the UK's largest IMAX screens opens in Blackpool as part of a multi-million-pound cinema complex.

The 10.8m-tall immersive IMAX screen will be the centrepiece of the Backlot Cinema, which is part of the town's £20M extension to the Houndshell Shopping Centre.

The steel-framed cinema complex will also include another eight conventional screens, 850 luxury seats, ground floor restaurants and a 2,090m<sup>2</sup> Wilko home retail store.

The overall scheme has been facilitated by £5M of funding from the Government's COVID-19 Getting Building Fund, following formal approval by the Lancashire Enterprise Partnership (LEP) in October 2020. Blackpool Council is funding

the balance of the scheme through prudential borrowing.

"We're thrilled to see this ambitious project come to life and to bring the IMAX experience to new audiences in the Blackpool area," says Alessandra Pavan Bernacchi, VP, Theatre Development at IMAX.

"We're excited for moviegoers to experience the latest blockbuster films in this new state-of-the-art IMAX theatre, which is sure to become a destination for premium entertainment and events in the community."

The scheme, which will provide over 100 jobs when it opens next year, started its construction programme earlier this year. When main contractor GRAHAM began its work, the site had already been cleared of any buildings and was being used as a car park.

Early works included the installation of CFA piles, which are up to 32m-deep and a retaining wall along three sides of the plot.

The site abuts the existing Houndshell Shopping Centre along one elevation and a ramp serving its car park on another.





A number of architectural cantilevers are incorporated into the steel frame.

Completing the new project's town centre integration, the cinema complex will link into the [shopping centre](#) at ground floor level.

The remaining two elevations face onto busy streets, meaning the construction site is very tight and confined, with its entire footprint earmarked for the development. With little room for storage and just one entry point for materials, the delivery and erection of the steel frame has been pre-planned accordingly.

"We started the [steelwork erection](#) with the area closest to the existing shopping centre; and using one [mobile crane](#) we are working our way out towards the main street and the site's entrance," explains EvadX Contracts Manager Andrew Roberts.

"Most of the steelwork has to arrive on a just-in-time basis and is erected that day."

The steel frame incorporates a number of different uses, with the Wilko store and restaurants at ground floor, and the cinema screens at first and second floor. Meanwhile, between the two cinema levels there is [mezzanine floor](#) that accommodates circulation areas.



### FACT FILE

#### Blackpool Backlot Cinema

Developer: **Blackpool Council**

Architect: **Covell Matthews Architects**

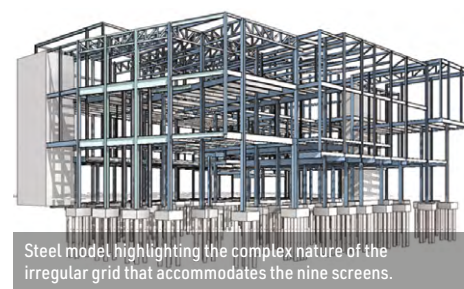
Main contractor: **GRAHAM**

Structural engineer:

**Sanderson Watts Associates**

Steelwork contractor: **EvadX**

Steel tonnage: **950t**



Steel model highlighting the complex nature of the irregular grid that accommodates the nine screens.

With all of these different uses to accommodate and the fact that nine cinema screens are located on the upper floors, the steel frame has had to be designed with an irregular column [grid pattern](#).

The Wilko store needed large open spans, which are up to 12m-long, and the cinema screens above have a similar requirement. However, getting all of the screens to be positioned and aligned with the columns at ground floor could not be done and so a series of transfer structures are required to support the upper levels.

Most of the screens are a different size, with the IMAX being the largest. This screen is positioned in the middle of the building at first floor level and unlike the other screens, it is a double-height space, spanned with a series of 25m-long rooftop trusses.

There are six trusses in total and they were all [fabricated](#) and [delivered to site](#) in two pieces, where they were bolted together and subsequently lifted into place as complete trusses.

"On a development project such as this, where the proposed building extension combines various uses at different storey levels, the size and height of the structural building frame can restrict the use of certain materials," says Covell Matthews Architects' Associate Richard Tumblety.

"Providing a high level of [fire](#) and acoustic performance, steel framing is one of the most practical construction materials for use in large complex multi-storey buildings."

[Acoustics](#) is an extremely important consideration for any cinema project and this one is no exception. Each of the nine screens is an acoustically isolated box, with their columns and raking seats all sat on acoustic pads. This will prevent any noise transference between the cinema

screens, the ground floor areas and the adjacent shopping centre, and even the streets outside.

Reaching an overall height of 20m, the building has strategically-positioned [bracing](#) that provides the steel frame with its [stability](#). As the upper floors have very few windows, the bracings are located in exterior walls and within interior partitions.

"The architectural design requires a number of large cantilevers to be employed to support the upper levels. A series of long spanning [steel trusses](#) and braced cantilever beams concealed within the architectural elevations will provide vertical and lateral support in these areas," says Sanderson Watts Associates' Senior Engineer Robert Watts.

Within the steel frame, there are a number of precast lift shafts and stair cores, but these provide no stability to the attached steelwork. Also, within the building, steel beams support [metal decking](#) and a concrete topping to form a [composite flooring solution](#) for the upper levels.

Summing up, Councillor Lynn Williams, Leader of Blackpool Council says: "We are delighted to welcome IMAX and Backlot Cinema to the Houndshell Shopping Centre as it will be a major draw for residents and visitors to the town centre.

"For the town centre to prosper we must continue to provide new reasons to attract residents and visitors and to extend the time of visits into the evening with more entertainment and leisure choices that the whole family can enjoy. The new multi-media cinema complex will provide something brand new for our residents combining a state-of-the-art cinematic experience but also the availability of new flexible creative spaces that many artists and businesses will also be able to benefit from." ■



# Industrial project stacks up

## FACT FILE

### Industria, Barking

Main client: Be First

Architect: Haworth Tompkins

Main contractor: McLaren Construction

Structural engineer:

Pinnacle Consulting Engineers

Steelwork contractor: BHC

Steel tonnage: 2,200t

Described as a vertical trading estate and delivering 45 units within a four-storey structure, Industria is a pioneering and modern approach to accommodating multiple industrial spaces within confined inner city sites.



A vehicular ramp will allow tenants on the upper floors to service their units with vans.

An innovative steel-framed industrial project in east London, could be a glimpse of the future as it is demonstrating how multiple manufacturing and warehousing facilities can be efficiently accommodated within a single structure, thereby maximising prime inner-city land.

Being developed by Be First, the regeneration arm of Barking and Dagenham Council, Industria represents an ambitious approach to modern industrial projects and is a move away from the traditional design of single storey units. Instead, this scheme will deliver light industrial and maker spaces within a modern sustainable and flexible four-storey structure.

The development is supported by £1M of the Mayor of London's Good Growth Fund, delivered through the London Economic Action Partnership, which will be invested alongside the local council's

investment of £33M.

Overall, the building will deliver around 10,000m<sup>2</sup> of industrial space with 45 SME and smaller 'flatted factory units of varying scales, accommodated vertically in a stacked design. The SME units will vary in size from 160m<sup>2</sup> to 475m<sup>2</sup>, while the small factory spaces will range from 20m<sup>2</sup> up to a maximum of 230m<sup>2</sup>.

Leader of Barking and Dagenham Council, Councillor Darren Rodwell says: "This is the sort of attractive and sustainable industrial development which will no doubt create quality jobs and a place where wine makers, artists and artisans will be able to thrive alongside more traditional trades.

The steel-framed structure consists of two wings, one of three-storeys and the other with four-storeys, with a service yard in between. At ground and first floor, the service yard is spanned by the floor above, while the uppermost second

floor yard is open to the elements.

Importantly, the upper levels are served by a helical vehicular ramp that will allow tenants to service their businesses directly.

Aiming to achieve a BREEAM 'Excellent' rating, the client says the project achieves generous floor-to-floor heights and spans with an efficient steel frame design.

"A number of options for the Industria project were considered, including the number of floors in the structure and the building materials to be used," says Pinnacle's Associate Engineer Monika Fiuk-Raquel.

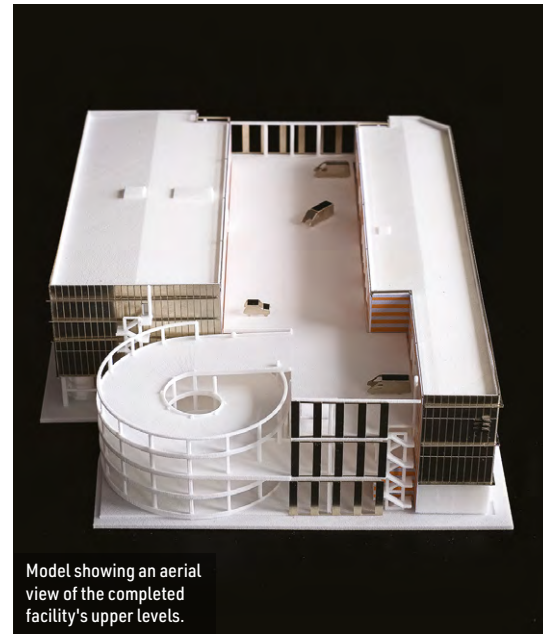
"This is one of the first stacked industrial buildings in the UK and so we looked at similar projects in Europe and chose a steel-framed design as it offered the most efficient and cost-effective solution."

The ground, first floor and some of the upper





The ramp is formed with cranked beams supporting metal decking and a concrete topping.



Model showing an aerial view of the completed facility's upper levels.

levels have an 8m-high floor-to-ceiling height, with spans of up to 8m in the unit spaces, and up to 18m in the service yard areas.

As flexibility is a key design criterion of this project the units can be joined together with adjacent spaces, while the high ceiling heights will also allow a mezzanine level to be inserted if required in the future.

The steel frame has been designed to accommodate very high loadings, enough to allow the future addition of an extra mezzanine floor and sufficient for 7m-high racking systems.

The uppermost second floor service yard allows access to another row of 8m-high units in the southern wing, while in the opposite northern wing there is a two-storey element.

“We call these ‘flatted factory’ units and they are aimed at small one to five people enterprises,” explains Haworth Tompkins Associate Director Hugo Braddick.

“There are two floors of these 4m-high spaces that have access to the service yard via a communal goods lift and stairs. The units share a kitchen area and toilets, and with flexibility at the heart of the

project’s design, they also can be used as single spaces or joined together with their immediate neighbours to form larger units.”

Forming part of a wider industrial masterplan, the Industria plot is a brownfield site previously occupied by a warehouse, which had been demolished prior to this current project getting underway.

Main contractor McLaren Construction inherited a cleared site, but still had to undertake a limited dig programme to remove existing piles. This then allowed new CFA piled foundations, which support the steel frame, to be installed.

While groundworks were still proceeding, the steelwork erection programme commenced earlier this year.

“We began by erecting the helical ramp, which is the furthest part of the structure from the site’s entrance, and thereby allowed us to work our way out of the plot with the subsequent steelwork phases,” says BHC Project Manager Bobby McCormick.

A series of cranked beams, connected by cross members create the helical ramp’s roadway,

which is then completed with metal decking and a concrete topping.

Fabricated box sections form the crash barriers, which are positioned along both sides of the ramp.

Once erected, the ramp was structurally-independent due to its shape and an internal bracing system formed with CHS members. The remainder of the Industria structure was then erected in phases, with the steelwork completed to the building’s full height in each stage.

The structure’s two wings feature a number of precast lift and stair cores, which were installed prior to the steelwork programme. The cores provide no structural stability, as this is derived from cross bracing, located around these precast elements and in bays where there are no windows.

BHC brought the main columns, which are up to 25m-high, to site as complete members. Throughout the scheme, steel beams that connect the columns, support metal decking and concrete topping to form a composite flooring solution that also acts as a diaphragm providing the overall structure with stability.

The heaviest individual steel member is a 17t >18



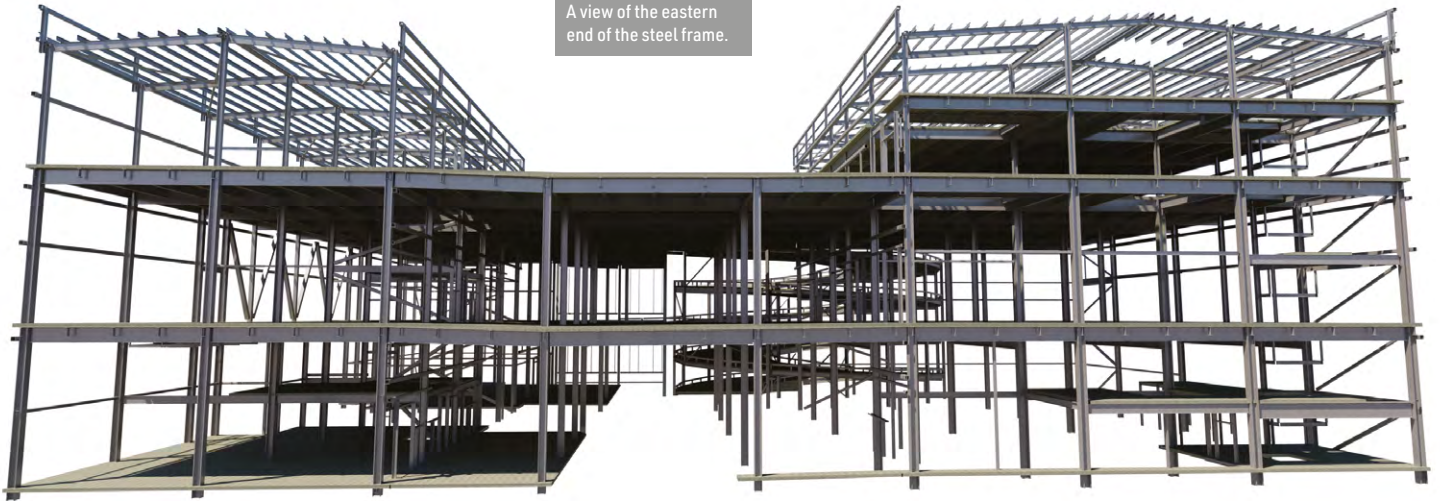
Flexibility has been designed into the project so it can be extended northwards into the adjacent plot.



The completed scheme will be book-ended by two living green walls.



A view of the eastern end of the steel frame.



►17 18m-long × 1,500mm-deep **fabricated girder** that is positioned at first floor level and helps create some internal column-free space within the ground floor service yard.

HGVs will have access to ground floor only, and to facilitate the trucks being able to turn around, some columns needed to be omitted.

A series of five 14m-long 1,500mm-deep girders, also positioned at first floor level, provides more column-free space in an adjacent part of the ground floor.

This column-free area will accommodate water tanks, plant, access to the building's goods lift and, providing even more flexibility to the overall design, a possible northern access/exit route if the project was to be extended to the adjacent plot in the future.

At present, the main entrance is located along the southern elevation and forming this column-free opening is a 25.3m-long × 8.4m-deep truss. Positioned at first floor level, the **truss** spans over the entrance, while also supporting the second-floor columns above.

Moving away from the traditional industrial warehouse-type building, the completed project will feature full-height, **glazed 'shopfront' units**, where passers-by will be able to view workers and

artisans at work. A new public café and business hub will also be positioned at ground floor, while the uppermost level will have a rooftop breakout space with views west towards the City.

External elevations are characterised by a naturalistic palette of **stainless steel**, textured precast concrete and black steel cladding panels, enlivened by openings and large-scale

signage in key locations.

The internal deck-facing **facades** are said to be more playful, with patterned, colourful corrugated metal. They bookend and incorporate the open deck ends, which are screened by RHS steel-framed living walls, through which glimpses of the interior elevations will be visible from the street.

Industria is due to be complete by mid-2023. ■



The upper level features one wing with a two-storey element.

## Future-proofing

David Brown of the SCI considers the future flexibility built into the Industria building at the design stage.

**F**or the steelwork contractor, the Industria project must have been a mix of painful detailing and welcome repeatability. The spiral access ramp involves very many connections where the beams are both inclined and at an angle on plan. Before CAD, these would have been painful to draw and challenging to **fabricate**. The internal supporting columns are aligned with their webs on the radial lines, so the primary beams must connect at an angle both horizontally and vertically on the minor axis of the column. To make life easier, probably to avoid the need to notch the beams to avoid clashes with the column flanges and to separate the otherwise common connection, the beams are connected to plates **welded** across the toes of the column. More fabrication effort, but perhaps an easier solution overall.

In contrast to the complexity of the spiral ramp, the majority of the two wings are reasonably orthodox construction, with significant repetition. Rectangular regular grids and standardised **connections** must have been a welcome relief.

The most significant feature of the structure is the allowance for adaptability built in at the **design** stage, which is an endorsement for the selection of structural steelwork. The potential to add a **mezzanine floor** obviously increases the design actions significantly. BRE Digest 437 refers to a distributed load on a mezzanine for "general storage" of 2.4 kN/m<sup>2</sup> per metre of available storage height, which could be a considerable load if the mezzanine were in an 8 m tall unit. BRE Digest 437 was published prior to the introduction of the **Eurocode** system, but the same values appear in the

UK National Annex to BS EN 1991-1-1. Racking up to 7 m is an alternative, so the description of "very high" loads in the main article is appropriate, or an understatement. Storage loads in the UK NA depend on the category of loading in Table NA.4 with a range of imposed loads given in Table NA.5. The categories cover loading even greater than 2.4 kN/m<sup>2</sup> per metre of storage height, so there must be some management of what tenants might store.

Increased loads affect the members, the connections, the equivalent horizontal forces used to allow for frame imperfection and the assessment of **structural stability**. For a given "shape" of loading on a frame (vertical uniformly distributed loads on all the floors for example), doubling the design loading will halve the value of  $\alpha_{cr}$ , used as a measure of frame stability. ■





# Commentary on the National Structural Steelwork Specification for Building Construction



BCSA Publication No. 66/22

## The 3rd edition of the Commentary on the National Structural Steelwork Specification for Building Construction 7th edition (NSSS) is now available.

The Commentary has been prepared to give guidance and additional information on the background and philosophy behind the recommendations given in the NSSS.

Main updates include:

- References to British Standards
- Section 5 – Workmanship
- Section 10 – Protective treatment (corrosion and fire)
- Section 11 – Quality management

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The publication can be purchased here, with BCSA members receiving a 20% discount on the £60.00 RRP.

# Steel creates Cyclone

Structural steelwork is playing a leading role in the creation of a new and exciting addition to the available attractions at Center Parcs Whinfell Forest.



## FACT FILE

**Center Parcs Whinfell Forest, Cumbria**

Client: Center Parcs

Architect: Holder Mathias Architects

Main contractor: SDC Builders

Structural engineer: Stantec

Steelwork contractor: TSI Structures

Steel tonnage: 90t

The 20m-high tower sits adjacent to an existing swimming pool building and both will be linked via a steel bridge.

A 125m-long ride, known as a Tropical Cyclone, where thrill-seekers, sat in inflatable rafts, are transported down a flume that incorporates twists, turns and drops is currently under construction at Center Parcs Whinfell Forest near Penrith in Cumbria.

This latest attraction is being realised with the aid of steel construction, as the giant flume is supported by a steel tower, that also includes a link bridge to an adjacent Subtropical Swimming Paradise building, as well as areas for the ride's associated plant equipment.

Including its plant areas, the steel-framed structure is 14.5m-wide at the base, 10m-wide at the tower and has an overall height of 20m. It is formed with 305UC columns that are connected by a series of 150mm x 150mm box section cladding rails.

A structural steel frame was the ideal choice for the project as Holder Mathias Architects' Associate Director David Gallimore explains: "Due to the confined nature of the site, surrounded by trees and areas still occupied by guests and staff, speed and safety of construction was of paramount importance.

"Consequently, steel has been used for the structure of the envelope above the level of the concrete plant room water tanks. Meanwhile, galvanizing and organic coatings are necessary to protect the steel from the pool chemicals in the atmosphere and provide the appropriate levels of fire resistance."

Working on behalf of SDC Builders, TSI Structures fabricated and then supplied the steelwork in small transportable loads before commencing the erection programme.

Due to the restricted nature of the site, the reduced size loads had to be meticulously planned on a just-in-time basis, which also needed to ensure there was no impact to the regular operation of the village or guest experience.

"The work site is quite confined, while access to the Center Parcs project is predominantly along small and winding roads, which are unsuitable for large trailers," further explains TSI Technical Director Adrian Betts.

"This meant the steelwork had to be delivered piece-small, including the main 20m-high columns, which were delivered in two pieces and have a bolted splice connection."

Hand-in-hand with the steel erection, suitable lifting locations had to be selected, which removed the need for any over-lifting or oversailing of the surrounding facilities

"This facilitated an erection sequence to be developed by the project team that allowed the works to continue safely while the pool was in use," adds SDC Builders Contracts Manager Mike Hodges.

Another of the main challenges for the onsite erection team was the fact that some of the steelwork was specified to be painted with Sherwin-Williams FIRETEX intumescent paint, while the remainder was coated with a high-gloss finish.

All of the painting was done offsite at TSI's paint shop so, once on site, the steel members, which are duplicated on many parts of the frame, had to be sorted and then erected in the correct sequence.

"Because of the nature of the structure, only certain parts need to be coated with intumescent



*"Due to the confined nature of the site, surrounded by trees and areas still occupied by guests and staff, speed and safety of construction was of paramount importance."*

fire protection," adds Mr Betts. "This included the areas used by customers, such as the **footbridge**, staircase, floors and fire escape routes."

The new steel-framed structure is supported by foundations cast into the top of existing reinforced concrete walls. The steel-frame is structurally-independent and gains its **stability** from cross bracings strategically positioned between the columns. The only location where the new steelwork connects into the adjacent swimming pool building is the link footbridge.

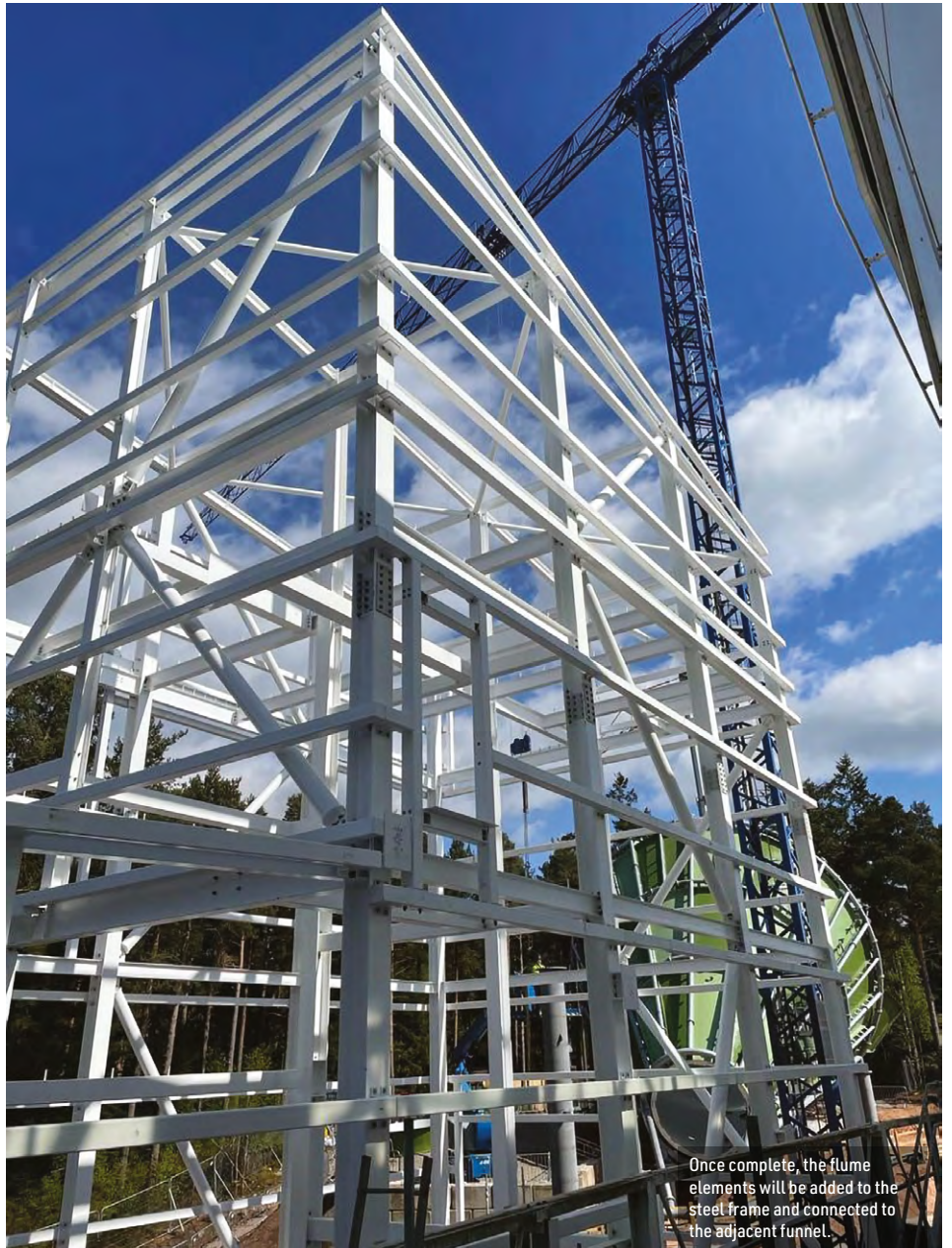
The footbridge is 7m-long x 4m-wide and is 3.2m-tall. The low-level walkway beams connect to an existing reinforced concrete beam, which is positioned under the floor within the main pool building, while the upper footbridge beams abut the adjoining structure, but do not connect to the swimming pool building.

"The steel-framed footbridge has been designed so it can be connected to the existing RC framed swimming pool without breaking through into the pool area," adds Mr Hodges.

"Once complete, the actual break-through works will take place behind a sealed construction screen, which will be erected overnight, when the pool is not in use, which will then allow the break-through to continue safely behind it."

Working alongside the steel erectors, SDC is also assembling the funnel and flume for the ride. Once the steelwork is in place and the **cladding** nearing completion, the final flume element will be installed to the tower and a weathertight seal made around the joint.

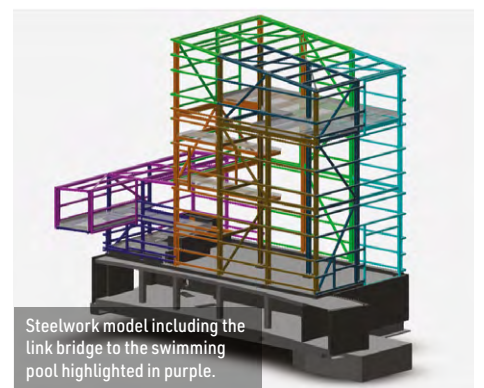
Center Parcs Whinfell Forest's Tropical Cyclone is due to be operational by early 2023. ■



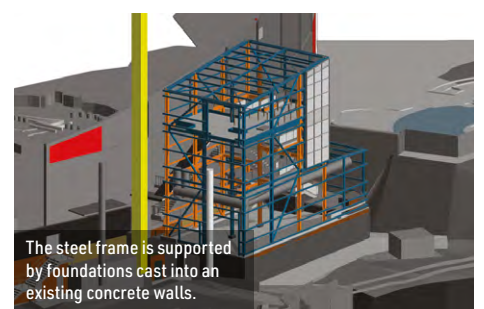
Once complete, the flume elements will be added to the steel frame and connected to the adjacent funnel.



Visualisation of the completed ride, set in its forest setting.



Steelwork model including the link bridge to the swimming pool highlighted in purple.



The steel frame is supported by foundations cast into an existing concrete walls.



# Portal frames for logistics expansion

## FACT FILE

**St Modwen Park Stoke Central**

Main client: St Modwen Logistics

Architect: RPS Group

Main contractor: Winvic Construction

Structural engineer: Nolan Associates

Steelwork contractor: Severfield

Steel tonnage: 1,060t



The warehouse incorporates integrated office space.

Steel construction is playing a leading role in a number of redevelopment and logistics projects in Stoke, including a four-span warehouse for the National Veterinary Services, which is rising up on the site of a former steelworks.

**B**ig changes are afoot in Stoke-on-Trent, as a number of major redevelopment schemes are either underway or in the pipeline.

Much of the work is being undertaken or planned for Stoke city centre and Hanley, but the area of Etruria, which is located between the two, is also the location for a considerable amount of investment.

The construction of warehousing logistics space is one of the leading drivers of this city-wide investment. Etruria is the location of St. Modwen Park Stoke Central, which is part of the wider 300-acre Festival Park development. The park is already home to a number of major [distribution centres](#) as well as office space, including Bet365, who have their purpose-built steel-framed headquarters building here (see NSC May 2016).

The majority of warehouse projects are designed and built as steel-framed structures and highlighting the sector's importance, developer St. Modwen Logistics has invested £65.5M to support regeneration in Stoke-on-Trent through the construction of more than 40,000m<sup>2</sup> of warehouse space in the past 18 months, with a further 44,500m<sup>2</sup> currently under development. The significant investment in the area builds on the £56M Levelling Up commitment, announced by the Chancellor in his autumn Budget last year, to support restoration work and encourage employment within the region.

Work is currently continuing at St Modwen Park Stoke Central and the latest scheme is a 20,900m<sup>2</sup>

steel-framed warehouse which will be home to Stoke-based National Veterinary Services (NVS).

St. Modwen Logistics recently signed a pre-let deal with NVS, which means main contractor Winvic is working closely with both companies to ensure the warehouse space meets the needs of NVS to supply and distribute products to animal health practices across the UK.

As well as the main warehouse space, which has a 15m haunch height, the project also includes an integrated three-storey 2,248m<sup>2</sup> office block and a 284m<sup>2</sup> two-storey transport hub.

Externally, Winvic has delivered the enabling civils and infrastructure works to create the development plateau and is installing all underground services, drainage and an attenuation pond. Soft landscaping will also be undertaken and parking created for 235 cars – with 20 per cent electric charging points – and 51 HGVs.

Winvic started onsite earlier this year and preparatory works also included the installation of pad foundations that allowed the [steelwork erection](#) programme to begin in June.

According to project engineers Nolan Associates, the site had previously been cleared of any buildings and a ground remediation programme had been undertaken across the entire plot. The re-engineered ground was consequently very hard and meant any excavation on the site was quite arduous.

“The areas for the pad foundations had to be ripped up, using a special excavator attachment,

prior to any excavation,” says Nolan Associates’ Andy Williams.

A new steel-framed structure being constructed on this brownfield site is apt, as it continues the plot’s connection to the material. The site was once occupied by Shelton Bar, which in its heyday had a 10,000-strong workforce and included five coal mines, a steelworks and rolling mills, blast furnaces and a bi-products factory. Half of the facility was closed down in the late 1970s, with the remainder finally ceasing operations in 2000.

Working on a [design and build](#) contract for the steelwork package, Severfield has [fabricated](#), supplied and erected the steelwork for the project.

The main warehouse is a four-span [portal-framed](#) structure, with a total length of 175m. The structure is based around a perimeter column spacing of 8m,



Steelwork contractor Severfield used three mobile cranes for the entire erection programme.





Future plans may include a further smaller warehouse to the east of the NVS distribution centre.

while internally the design incorporates a hit-and-miss column configuration. This means the columns are spaced at 16m intervals along the three valley lines, thereby creating extra column-free floorspace.

Each 30m-wide span is formed with two spliced rafters, which were assembled on the ground and lifted into place as a complete section. Because of the hit-and-miss layout, half of the roof rafters are not directly supported by internal columns, but are instead connected to adjoining rafters via high-level hip beams that transfer the loads to adjacent columns.

Using a combination of three mobile cranes – one 90t-capacity unit and two 70t units – for its entire steelwork erection programme, Severfield initially erected the main office block, which protrudes outwards from the warehouse structure and forming

an L-shape on plan.

Scheduled to complete in November 2022, with early access-provision in October, the project has been designed with Winvic's input to the St. Modwen Swan Standard, which puts the environment, sustainability and employee wellbeing at its core. The sustainability features include an EPC Rating 'A', a BREEAM 'Very Good' rating, a hybrid air source heat pump and a carbon neutral envelope system.

Danny Nelson, Winvic's Head of Industrial, Logistics and Distribution, commented: "We've worked with St. Modwen Logistics for many years now and it's motivating for our whole team to be appointed again, especially just a couple of months after we started on a significant four-warehouse scheme for the developer in Derby. As always, we

will be delivering the scheme to the St. Modwen Swan Standard, which focusses on sustainability, while also driving the scheme safely, skilfully and swiftly in order to handover in November this year."

Jake Shilston, Development Director at St. Modwen Logistics added, "The St. Modwen Swan Standard focuses on responsible building practices and core to this is our commitment to delivering sustainability, net carbon reduction and improving the wellbeing of those who work on our parks and live nearby. We continuously strive to improve the quality of our parks and know Winvic shares our ambitions to meet the needs of our customer, NVS, their employees and the local community. Through a true partnership, we have every confidence in delivering another high-quality building at St. Modwen Park Stoke Central." ■



Steelwork erection progresses on the four-span portal-framed structure.



# Bolted connections to hollow sections and column webs

David Brown of the SCI reviews design models – including simple analysis, resistance formulae and FE-based software.

## Connections to planar elements

Designers occasionally wish to develop a bolted connection to the wall of a hollow section, or to the web of a member – generally a column, as shown in Figure 1. Whilst **fin plates**, extended plates and plates across the toes of the supporting member can be used (Figure 2) particularly when the loading is shear only, situations do arise when **end plate** type connections are required. If the member is subject to an applied moment, or to an axial tension, the bolts are in tension and the planar element of the connected member (the hollow section wall or member web) is subject to tension applied by the bolts. The out of plane resistance of those planar elements is the subject of this technical article.

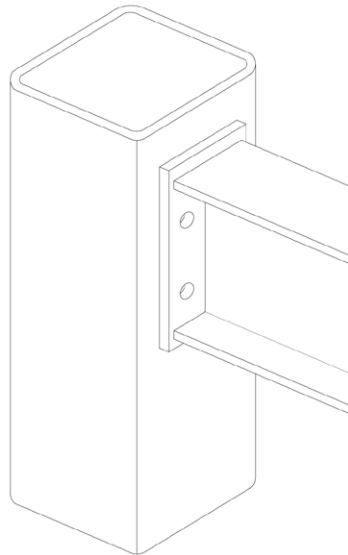


Figure 1: Bolted connection to hollow section

Some details adopt ordinary bolts, with an access hole in the side wall of the member, though this is not common in the author's experience. Some designers propose forming threaded holes, by **drilling** and tapping the member. The UK has generally advised against drilling and tapping holes as the result is very different from the use of a high strength nut. Nuts have an ultimate strength of 800 N/mm<sup>2</sup> or 1000 N/mm<sup>2</sup> (Property Class 8.8 and 10.9 respectively) so the performance of a bolt threaded in material with an ultimate strength of perhaps 500 N/mm<sup>2</sup> will be rather different. In contrast to the UK view, the proposed revisions to EN 1993-1-8 include a table giving the minimum length of thread engagement in a threaded hole in S235, S355, S460 and stronger material. A note to the table allows the minimum thread engagement length to be set by the National Annex, so this will be the opportunity for the UK to prohibit this approach if required.

## Critical design checks

In the typical details illustrated in Figure 1, the critical check is not the resistance of the fixing, which may be selected to accommodate the **design** forces. The critical check is very likely to be the resistance of the supporting member to the out-of-plane forces, particularly with the relatively thin walls of hollow sections and some webs, depending on the section. The ultimate resistance will obviously be important, but the deformation at working loads should also be considered as any rotation of the joint will contribute to the overall deformation of the supported element – for example if a parapet handrail had a base connection of this form.

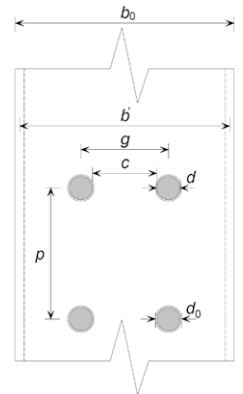
## Design models

Many designers will know of the CIDECT Design Guides, covering all aspects of **construction** with hollow sections. Design Guide 9<sup>2</sup> provides an expression for the resistance of a hollow section face in equation 6.27 of the guide. The resistance expression covers a group of four bolts in tension, as would commonly be found around the tension flange of a beam. The resistance expression is reproduced below, but with the nomenclature changed to Eurocode terms:

$$F_{rd} = f(n) \frac{f_t t^2}{(1-c/b')} \left[ 2 \frac{p-d}{b'} + 4(1-c/b')^{0.5} \right]$$

Where:

- $p$  is the vertical pitch of the bolt group
- $g$  is the horizontal gauge of the bolt group
- $d$  is the bolt diameter
- $b' = b_0 - t$
- $c = g - d$
- $t$  is the thickness of the hollow section wall
- $f(n) = 1 + n \leq 1.0$
- $n = \text{column stress} / \text{yield stress}$



Designers should note that in the CIDECT design guide, compression is negative. This is the reverse of the sign convention in BS EN 1993-1-8.

Gomes *et al*<sup>3</sup> developed a formula for resistance which allowed for the relative width of the bolt group within the hollow sections wall (i.e. is the bolt group relatively narrow or wide with respect to the width of the wall?).

The formula developed by Gomes *et al* is given over the page:

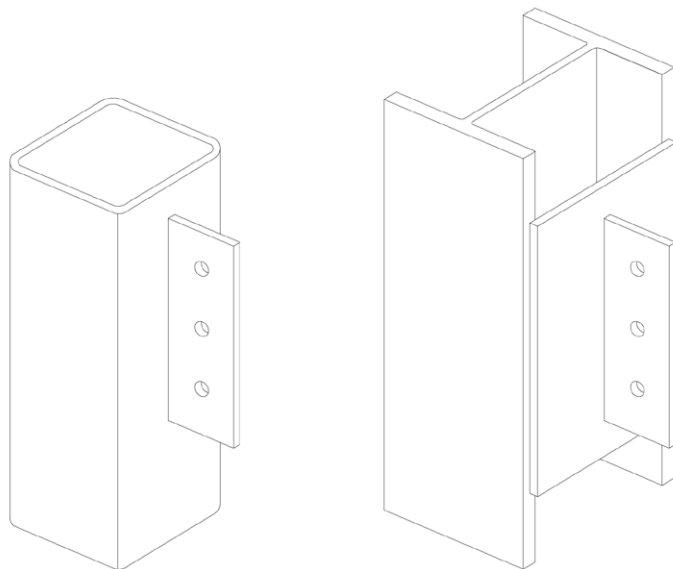


Figure 2: Alternative bolted connections

## "Blind" connectors

For connections to **hollow sections** and other situations with one-sided access, various proprietary fixings are available<sup>1</sup>. Among these fixings are bolts with a slotted sleeve which is designed to flare out and provide the anchor on the side with no access. The deformation of the sleeve may be by an internal mandrel driven through the bolt, or by a threaded cone which rides along the bolt shank as the bolt is tightened. Other fixings include bolts with a pivoted anchor initially lying within a slot in the bolt shank. After inserting and rotating the bolt the anchor pivots into position.



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$$F_{rd} = k \frac{\pi f_y t^2}{1 - \frac{b'}{b_0}} \left[ \left( 1 - \frac{b'}{b_0} \right)^{0.5} + \frac{2c}{\pi b_0} \right]$$

Where:

If  $\frac{b'+c'}{b_0} > 1$  then  $k = 1.0$

Otherwise  $k = 0.7 + \frac{0.6(b'+c')}{b_0}$

In the above expressions the quite different definitions of  $b'$  and  $c'$  should be noted:

$b' = g + 0.9d_{ba}$  and  $c' = p + 0.9d_{ba}$  where  $d_{ba}$  is the effective diameter of the bolt clamping area (the average of the dimensions across the flats and across the points of the bolt head).

Finally, a formula is given in P358<sup>4</sup> used for the tying resistance of a bolted connection to a hollow section wall. The expression is reproduced below but adopting the **yield strength** rather than the ultimate strength and using nomenclature previously defined.

$$F_{rd} = \frac{8M_{pl}}{(1-\beta_1)} [\eta_1 + 1.5(1-\beta_1)^{0.5}(1-\gamma_1)^{0.5}]$$

Where:

$$M_{pl} = \frac{f_y t^2}{4}$$

$$\eta_1 = \frac{(n_1-1)p \cdot \frac{n_1 d_0}{2}}{b_0 - 3t}, \text{ which is equivalent to } \frac{p \cdot d_0}{(b_0 - 3t)} \text{ for a group of four bolts}$$

$$\beta_1 = \frac{g}{(b_0 - 3t)}$$

$$\gamma_1 = \frac{d_0}{(b_0 - 3t)}$$

$d_0$  is the diameter of the hole

$n_1$  is the number of rows of bolts

The general similarities between the expressions can be seen. The multiplier of 1.5 in the P358 expression is included to allow for axial compression in the column, but there is no indication of the stress ratio assumed. It should be noted that if the multiplier were larger, the resistance increases, so the value should decrease with increasing compression.

**Comparison of results**

Results are presented in Table 1 for the three design approaches, for two arrangements in a S355 SHS. Wang *et al*<sup>5</sup> undertook physical tests and completed the same calculations – their values are shown for comparison. Whilst generally good agreement is seen for the CIDECT and SCI calculated

resistances, there is clearly a significant difference when calculating the resistance according to Gomes for the 90 mm gauge. The test resistance indicated as “yield” is based on a limiting deformation of the chord face, equal to 3% of the SHS face, or 4.5 mm for the 150 SHS tested. This limiting deformation is recommended by CIDECT<sup>2</sup> and reflected in the resistance formulae given in the design guides.

Resistance calculations	$b_0 = 150 \text{ mm}; t = 8 \text{ mm}; d = 16 \text{ mm}; g = 60 \text{ mm}; p = 100 \text{ mm}$		$b_0 = 150 \text{ mm}; t = 8 \text{ mm}; d = 16 \text{ mm}; g = 90 \text{ mm}; p = 100 \text{ mm}$			
	Resistance (kN) according to design model					
	Gomes	CIDECT	P358	Gomes	CIDECT	P358
SCI	189	148	144	291	187	222
Wang et al	201	149	139	444	189	215
Test result (“yield”)	174			242		

Table 1: Calculated resistances for bolted connections to SHS face

There are many uncertainties in Table 1. Only one test was completed for each arrangement, so no statistical analysis is possible. It is not clear if the presented results allow for the measured **material properties**. The results for CIDECT assume no compression in the column (which is unreasonable; introducing compression reduces the resistance considerably) whilst the P358 calculation has an allowance for some (unspecified) compression. The P358 expression is for tying resistance, when irreversible permanent deformation is anticipated.

The paper by Wang *et al* describes three modes of failure when testing the expanding anchor type fixing. In the first mode, which happened in every test when the SHS wall was 5 mm, the fixings deformed and pulled through the SHS. In mode 2, failure was by a combination of deformation of the SHS wall and tensile failure of the fixings. Mode 3 was characterised by failure of the fixings. Pull-through is a very variable mode of failure and should be avoided. Assessment and evaluation standards for blind fasteners, such as EAD 330001<sup>6</sup> insist that the failure mode cannot be pull-through. Reference 1 reports this behaviour in wall thicknesses below 8 mm.

**FE models**

**Modelling** the connection in a widely-used FE-based software yielded a maximum tension of around 200 kN for the bolts at 60 mm gauge, applying the 3% deformation limit to the SHS. This contrasts with the CIDECT value

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of 148 kN and P358 value of 144 kN. A check of the second connection with bolts at 90 mm gauge could not be completed – the software reported that the bolts would clash with the internal radius of the SHS.

With an axial compression of 300 kN the maximum tension reduced slightly. With an axial compression of 600 kN, the maximum tension reduced to around 185 kN. At this level of compressive stress, the CIDECT resistance drops from 148 kN to 92 kN.

**Including deformation in compression**

When bolting to an SHS wall, or to a column web, whilst the tension zone deforms in one direction, the compression zone will deform in the opposite direction, contributing to the overall rotation of the joint. Reference 3 offers advice on the calculation of the resistance in this situation.

**Simple alternatives**

In real life, plenty of connections will have to be made where the bolts cannot be located symmetrically to the supporting member. In these cases, a much simpler model may be appropriate, analysing a “beam” spanning between “supports”, with point loads at the positions of the fixings. A traditional assumption is that the width of the “beam” is defined by considering a 45° spread back to the support (but not double counting with an adjacent “beam”). Some assumptions need to be made about fixity at the “supports”. The development of a simple design model is shown in Figure 3 (adapted from Figure 4.9 in reference 2).

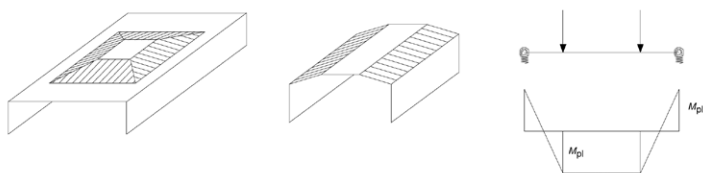
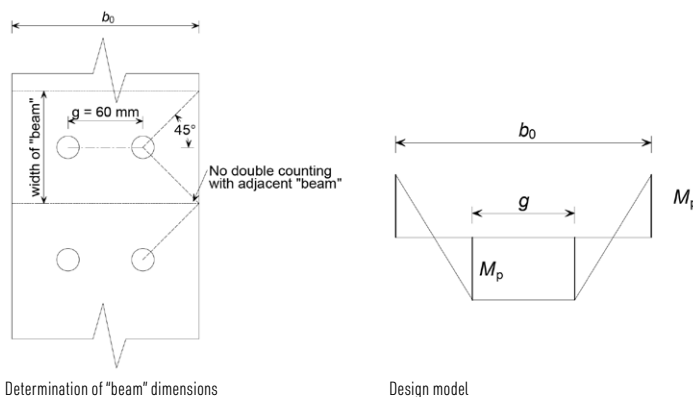


Figure 3: Development of design model

If the bolts are symmetrically placed at 60 mm gauge, as shown in Figure 4 the distance to the side walls is 45 mm. If dispersion in each direction is 45°, then the width of the “beam” is 90 mm (which does not double count the adjacent “beam”). With four plastic hinges, each 90 mm long, the resistance of the 8 mm wall is given by:

$$4 \left[ \frac{355 \times 90 \times 8^2}{4} \right] \times 10^{-3} = 45 \text{ kN}$$



Determination of “beam” dimensions

Design model

Figure 4: Simple design model

The resistance is significantly less than the CIDECT formula, and much lower than FE, but simple and conservative.

**Conclusions**

For connections to thin elements such as hollow section walls or column webs, the fixing is generally not the critical component – it can be sized to suit. Several design models are available, with significant variations in the results. Simple models represent one end of the range, and FE the other. Whilst ultimate resistance is critical, designers should not forget the deformation of the components at serviceability loads which contribute to overall joint rotation. Finally, fixings should be specified to ensure that pull-through is not the failure mode, which may govern in thin material! ■

- 1 Tizani, W. Nethercot, D.A.; **The practice of blind bolting connections to structural hollow sections: A review**; *Steel and composite structures*, March 2001
- 2 Kurobane, Y; Packer, J.A; Wardenier, J; Yeomans, N.; **Design Guide for structural hollow section column connections**; *CIDECT Design Guide 9*, CIDECT, 2004
- 3 Gomes, F. C. T; Jaspart, J. P; Maquoi, R.; **Moment capacity of beam-to-column minor axis joints**; *Proceedings of IABSE International Colloquium on semi-rigid structural connections, Turkey 1996*, IABSE, 1996
- 4 **Joints in steel construction: Simple joints to Eurocode 3 (P358)** ;SCI & BCSA, 2014
- 5 Wang, Z-Y; Wang, Q-Y.; **Yield and ultimate strength determination of a blind bolted end plate connection to square hollow section column**; Elsevier, 2015
- 6 EAD 330001-00-0602; **Expanding structural bolting assemblies for blind fasteners**, EOTA 2017

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# AD 491: Hydrogen embrittlement in structural bolting assemblies - effects and remedies

## Introduction

Hydrogen embrittlement is a mode of failure that can affect high strength structural steel bolts. It is a reduction in the ductility of steel due to absorbed hydrogen making the steel less able to support the imposed stresses which can lead to the development of micro cracking and eventually failure.

This mode of failure is not well understood by engineers and specifiers, as all too often high strength steel bolts are specified without considering the implications of hydrogen embrittlement. This technical note briefly explains the three factors that need to be present to trigger this mode of failure and how this can be avoided.

## What triggers hydrogen embrittlement failure?

For this mode of failure to occur the following three factors must be present:

- The steel must be a high strength steel, typically above 1000 N/mm<sup>2</sup>, this includes property class 10.9 bolts and above, and
- There must be a tensile stress in the steel (due to the preload in a bolt or externally applied loads), and
- The steel must have absorbed atomic hydrogen. This is explained in more detail in the next paragraph.

A more detailed explanation of hydrogen embrittlement in structural fasteners is given in

*Hydrogen Embrittlement - Its effect on Structural Bolting Assemblies*, which is available at: [www.steelconstruction.info/Fabrication#Resources](http://www.steelconstruction.info/Fabrication#Resources).

## Sources of absorbed hydrogen

Absorbed atomic hydrogen can come from two sources:

- From the manufacturing process – i.e. Internal hydrogen embrittlement
- From the environment – i.e. Environmental hydrogen embrittlement

Studies have shown that hydrogen can be absorbed during manufacture, e.g. certain types of heat treatment and surface coatings. To avoid this, the manufacturing process must be carefully controlled. The necessary controls and tests are given in the 'BCSA Model Specification for the Purchase of Structural Bolting Assemblies and Holding Down Bolts' (MPS), and high strength bolts should be specified in accordance with this specification. The MPS is also available at: [www.steelconstruction.info/Fabrication#Resources](http://www.steelconstruction.info/Fabrication#Resources).

Environmental hydrogen occurs when the steel is subject to corrosion from the environment. This can be avoided by designing the connections of a structure in such a way that they do not put high tensile strength bolting assemblies into areas where water or other electrolytes are allowed to collect and remain. Both coated and uncoated

fasteners are susceptible to environmental hydrogen embrittlement.

## Conclusion

By following the recommendations below, the risk of hydrogen embrittlement can be significantly reduced:

- Structural bolting assemblies should be obtained from approved suppliers certified to National Highways Sector Scheme 3 (NHSS3) and that bolts conform to the BCSA MPS. A list of Approved Suppliers can be found on the LANTRA Schedule of Suppliers website and a list of the BCSA suppliers of structural fasteners complying with NHSS3 and the MPS can be found in the 'Industry members' listing at the back of New Steel Construction or on the BCSA website [www.steelconstruction.org](http://www.steelconstruction.org) and,
- Ensure that the design of the connections does not put high strength steel bolting assemblies into areas where water or other electrolytes are allowed to collect and remain. This applies to both coated and uncoated fasteners

Contact: **Ana M. Girão Coelho**  
Email: [ana.girao-coelho@steelconstruction.org](mailto:ana.girao-coelho@steelconstruction.org)

## New and revised codes and standards

From BSI Updates July and August 2022

### BS EN PUBLICATIONS

#### BS EN ISO 9016:2022

Destructive tests on welds in metallic materials. Impact tests. Test specimen location, notch orientation and examination  
*supersedes BS EN ISO 9016:2012*

#### BS EN ISO 22057:2022

Sustainability in buildings and civil engineering works. Data templates for the use of environmental product declarations (EPDs) for construction products in building information modelling (BIM)  
*no current standard is superseded*

### CORRIGENDA TO BRITISH STANDARDS

#### BS EN ISO 18203:2022

Steel. Determination of the thickness of surface-hardened layers  
*Corrigendum, June 2022*

### BRITISH STANDARDS REVIEWED AND CONFIRMED

#### PD ISO/TR 16576:2017

Fire safety engineering. Examples of fire safety objectives, functional requirements and safety criteria

#### PD ISO/TR 24679-2:2017

Fire safety engineering. Performance of structure in fire. Example of an airport terminal

### NEW WORK STARTED

#### EN 1991-1-1

Eurocode 1. Actions on structures. General actions. Specific weight of materials, self-weight of construction works and imposed loads for buildings  
*will supersede BS EN 1991-1-1:2002*

#### EN 1991-1-3

Eurocode 1. Actions on structures. General actions. Snow loads  
*will supersede BS EN 1991-1-3:2003+A1:2015*

#### EN 1991-1-4

Eurocode 1. Actions on structures. General actions. Wind actions  
*will supersede BS EN 1991-1-4:2005+A1:2010*

#### EN 1991-1-5

Eurocode 1. Actions on structures. General actions. Thermal actions  
*will supersede BS EN 1991-1-5:2003*

#### EN 1991-1-6

Eurocode 1. Actions on structures. General actions. Actions during execution  
*will supersede BS EN 1991-1-6:2005*

#### EN 1991-1-7

Eurocode 1. Actions on structures. General actions. Accidental actions  
*will supersede BS EN 1991-1-7:2006+A1:2014*

#### EN 1994-1-1

Eurocode 4. Design of composite steel and concrete structures. General rules and rules for buildings  
*will supersede BS EN 1994-1-1:2004*

#### EN 1994-2

Eurocode 4. Design of composite steel and concrete structures. General rules and rules for bridges  
*will supersede BS EN 1994-2:2005*





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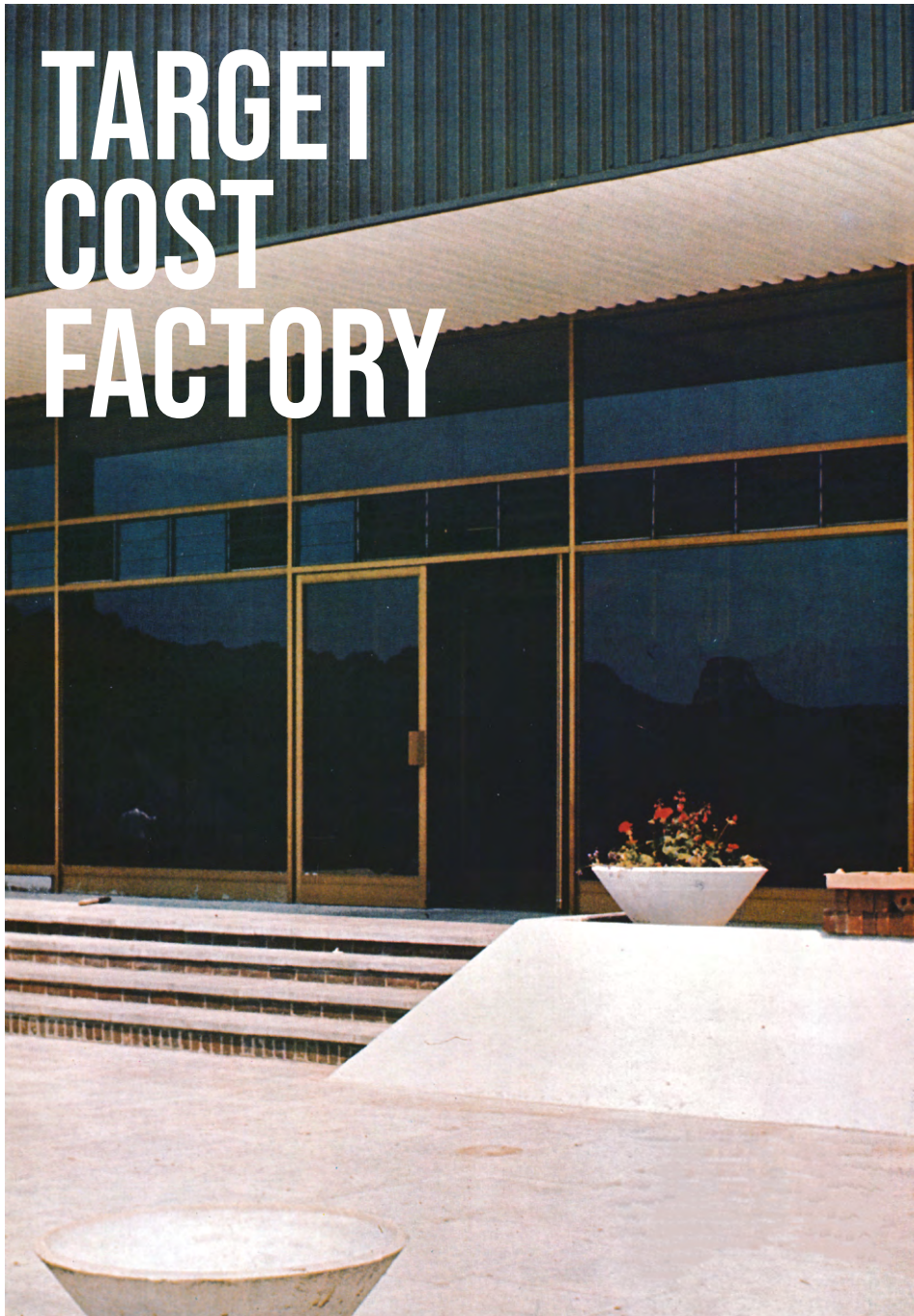
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- The Green Books
- The Blue Book
- Eurocode design guides
- Advisory Desk Notes
- Steel section tables
- Steel design tools

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**Ofrex Engineering Ltd are moving to South Wales from overcrowded South London. These notes briefly describe the new factory built in a Target Cost Management Contract by Module 2 Ltd and include a number of pictures taken in July this year just prior to the official opening.**

Ofrex Engineering Ltd, one of the four manufacturing companies in the Ofrex Group, is moving its entire manufacturing operation from a number of premises in South London to a new building in South Wales. There were a number of reasons for this move including the inability to expand further in somewhat cramped London, the difficulties with transport and the high cost of new premises in the South-East. The new site was chosen as it allows continuous expansion, there is a good labour supply and it has a pleasant environment.

The site lies in the Garw Valley at Llangeinor and is 12 acres in extent. A river flows down

this valley and had to be diverted as its course was originally down the centre of the site. Over the centuries a peat bog had developed to a depth of 12 feet in places and much of it had to be excavated and thousands of cubic yards of fill had to be placed to prepare the site. The premises will be fully occupied by around mid-1973 when there should be about 400 employees. The factory is planned to break down the barriers between production office workers and management. There are large glassed-in open-plan offices and a series of walkways over the factory floor connecting them, so that all movements within the factory will be a source

FROM

## Building with Steel

November 1971

of constant communication between all types of employee. All employees use the same entrance and all, including the directors, share the same cafeteria which can also be used as a social centre at weekends and in the evening.

The factory consists of two main blocks totalling an area of 113,000ft<sup>2</sup> of which Block A is 320ft × 240ft, Block B is 560ft × 60ft, and the remainder is made up from the boiler house and a number of outhouses. Block A houses the staple machine assembly together with staple production, cafeteria and offices while Block B contains the relatively heavy manufacturing facilities for the stapling machines where components are pressed, plated, painted, welded, etc. The structure is all steel and is assembled from columns, beams and lattice girder trusses of which the main spans are 60ft and 80ft. Cladding is profiled plastic-coated steel sheet manufactured by the British Steel Corporation.

Building work involved the installation of highly complex mechanical and electrical services including an efficient treatment plant to deal with toxic chemicals such as cyanide, acids and others emanating from the nickel, chromium and zinc plating of staple machines. This plant ensures that the 10 per cent of water which is discharged (90 per cent is recirculated) is, in fact, clean enough to drink and hence has no pollutant effect on local supplies. The factory areas are mainly windowless as this permits much closer control of the interior environment. However, there are two internal landscaped courtyards and these can be seen from the production areas and the open-plan offices thus minimizing any feeling of enclosure.

The Directors offices and the Board Room face south and are fully glazed and air conditioned. These, together with the 200-seater cafeteria are glazed with Spectrafloat tinted glass to help with temperature control. Production control and general administration offices are incorporated in the first-floor gallery which is internal and integrated with the production areas.

The factory has been built to a Target Cost Management Contract in which Module 2 Ltd provided a complete design service on a fee basis. This encompasses amongst other things architecture, structural engineering, mechanical and electrical services, landscaping and project management services, including resident site management.

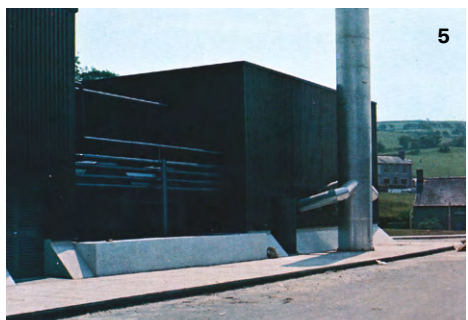
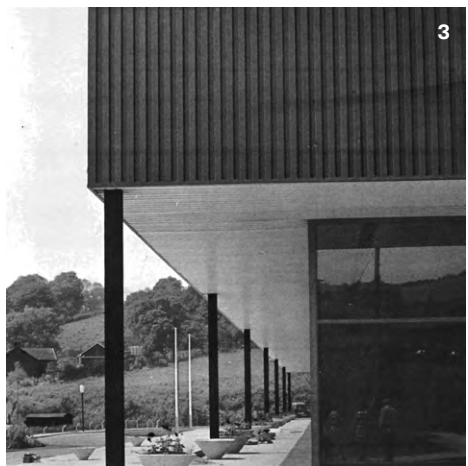
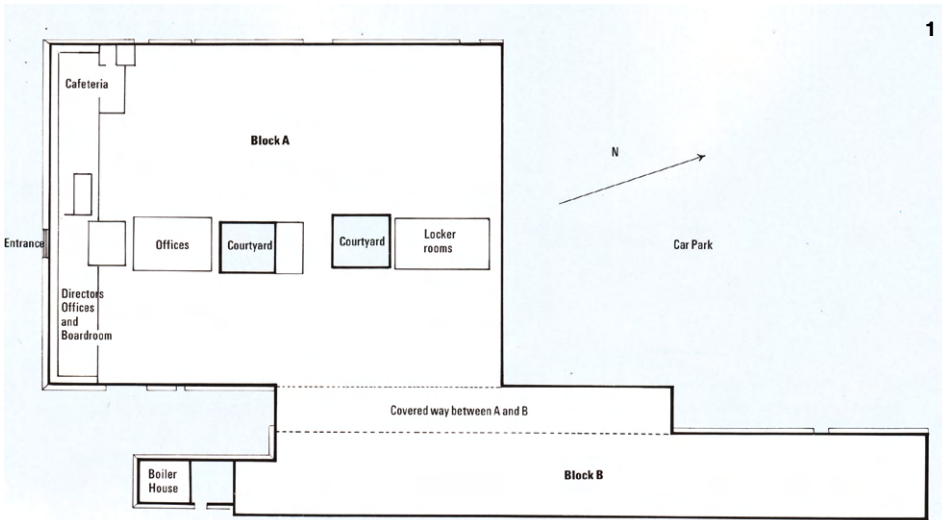


1. Schematic plan of the factory. The river has been diverted to run slightly west of the site. Future plans include development over the present car park.
2. The effect of the bronze tinted glass can be seen in this interior view of the canteen.
3. The entrance portico from the east.
4. Simple lattice girders for services access. The decking is steel sheet
5. This view of the boilerhouse also shows the rural nature of the site

This type of contract contains incentive arrangements whereby Module 2 shared in savings achieved on the target cost. Ofrex were attracted to the contract also because it meant that one organization controlled both design and construction and, furthermore, they would themselves participate in a 'profit sharing' arrangement whereby they would benefit considerably from savings obtained by Module 2 during the project.

Construction began in February 1971 and there was partial occupation in March 1972 while the building works were finished in July 1972. These times were on schedule despite a number of considerable problems arising in the early stages including particularly bad weather, the presence of artesian water and the extent of the peat bog.

The factory was officially opened on 18 July by HRH Princess Anne. It has brought a measure of prosperity to the valley which had been affected by the run-down of coal mining and is one of the first new industrial enterprises being brought to the area.







# Steelwork contractors for buildings

Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland. Details of BCSA membership and services can be obtained from

Lorraine MacKinder, Membership Manager

The British Constructional Steelwork Association Limited, Unit 4 Hayfield Business Park, Field Lane, Auckley, Doncaster DN9 3FL

Tel: 020 7747 8121 Email: [lorraine.mackinder@steelconstruction.org](mailto:lorraine.mackinder@steelconstruction.org)

Applicants may be registered in one or more Buildings category to undertake the fabrication and the responsibility for any design and erection of:

- C** Heavy industrial platework for plant structures, bunkers, hoppers, silos etc  
**D** High rise buildings (offices etc over 15 storeys)  
**E** Large span portals (over 30m)  
**F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)  
**G** Medium rise buildings (from 5 to 15 storeys)  
**H** Large span trusswork (over 20m)  
**J** Tubular steelwork where tubular construction forms a major part of the structure  
**K** Towers and masts  
**L** Architectural steelwork for staircases, balconies, canopies etc  
**M** Frames for machinery, supports for plant and conveyors  
**N** Large grandstands and stadia (over 5000 persons)  
**Q** Specialist fabrication services (eg bending, cellular/castellated beams, plate girders)  
**R** Refurbishment  
**S** Lighter fabrications including fire escapes, ladders and catwalks  
**FPC** Factory Production Control certification to BS EN 1090-1  
 1 - Execution Class 1      2 - Execution Class 2  
 3 - Execution Class 3      4 - Execution Class 4  
**BIM** BIM Level 2 assessed  
**QM** Quality management certification to ISO 9001  
**SCM** Steel Construction Sustainability Charter  
 ● = Gold   ● = Silver, ● = Bronze, ● = Certificate

## Notes

(1) Contracts which are primarily steelwork but which may include associated works. The steelwork contract value for which a company is pre-qualified under the Scheme is intended to give guidance on the size of steelwork contract that can be undertaken; where a project lasts longer than a year, the value is the proportion of the steelwork contract to be undertaken within a 12 month period.

Where an asterisk (\*) appears against any company's classification number, this indicates that the assets required for this classification level are those of the parent company.

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
A C Bacon Engineering Ltd	01953 850611			●	●	●	●				●			●		✓	2			Up to £3,000,000
Adey Steel Ltd	01509 556677	●		●	●	●	●	●	●	●	●			●	●	✓	3		●	Up to £3,000,000
Adstone Construction Ltd	01905 794561			●	●	●	●							●		✓	2	✓	●	Up to £3,000,000
AJ Engineering & Construction Services Ltd	01309 671919			●	●		●		●	●	●			●	●	✓	4		●	Up to £3,000,000
Angle Ring Company Ltd	0121 557 7241													●		✓	4			Up to £1,400,000*
Arminhall Engineering Ltd	01799 524510	●		●	●		●			●	●			●	●	✓	2		●	Up to £1,400,000
Arromax Structures Ltd	01623 747466			●	●	●	●	●	●	●	●			●			2			Up to £800,000
ASME Engineering Ltd	020 8966 7150			●	●	●		●		●	●			●	●	✓	4		●	Up to £4,000,000
Atlasco Constructional Engineers Ltd	01782 564711			●	●	●	●			●	●			●	●	✓	2			Up to £1,400,000
B D Structures Ltd	01942 817770			●	●	●	●				●	●		●	●	✓	2	✓	●	Up to £1,400,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●					●		●	✓	4	✓	●	Up to £1,400,000
Barnshaw Section Benders Ltd	0121 557 8261												●			✓	4			Up to £1,400,000
BHC Ltd	01555 840006	●	●	●	●	●	●	●		●	●	●		●	●	✓	4	✓	●	Above £6,000,000
Billington Structures Ltd	01226 340666	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	●	Above £6,000,000
Border Steelwork Structures Ltd	01228 548744			●	●	●	●			●	●			●			4			Up to £3,000,000
Bourne Group Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●		●	●	●	●	●	●	●	●			●	●	✓	4		●	Up to £6,000,000
Cairnhill Structures Ltd	01236 449393	●		●	●	●	●	●						●	✓	4			●	Up to £6,000,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●		●	●	●		●	●	✓	4	✓	●	Above £6,000,000
Cementation Fabrications	0300 105 0135	●		●		●	●	●	●	●	●		●	●	●	✓	3		●	Up to £6,000,000
CMF Ltd	020 8844 0940			●		●	●			●	●			●	✓	4				Up to £6,000,000
Cook Fabrications Ltd	01303 893011			●	●	●	●			●	●			●	●	✓	2			Up to £1,400,000
Coventry Construction Ltd	024 7646 4484			●	●	●	●		●	●	●			●	●	✓	4			Up to £1,400,000
DAM Structures Ltd	01377 271843	●		●	●	●		●	●	●	●			●	✓	4				Up to £6,000,000
D H Structures Ltd	01785 246269			●	●		●				●						2			Up to £200,000
D Hughes Welding & Fabrication Ltd	01248 421104			●	●	●	●	●	●	●	●		●	●	●	✓	4			Up to £400,000
Donyal Engineering Ltd	01207 270909	●		●				●	●					●	●		3			Up to £1,400,000
Duggan Steel	00 353 29 70072	●	●	●	●	●	●	●	●		●			●	✓	4				Up to £6,000,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●	●	●	●	●			●	●	✓	4		●	Up to £3,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	●	Above £6,000,000
EvadX Ltd	01745 336413		●	●	●	●	●	●		●	●	●		●	✓	3			●	Up to £4,000,000
Four Bay Structures Ltd	01603 758141			●	●	●	●	●		●	●			●	●		2			Up to £1,400,000
Four-Tees Engineers Ltd	01489 885899	●		●		●	●	●	●	●	●		●	●	✓	3			●	Up to £2,000,000



Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
Gorge Fabrications Ltd	0121 522 5770				●	●	●	●		●				●	●	✓	3			Up to £1,400,000
G.R. Carr (Essex) Ltd	01286 535501	●		●	●			●			●			●	●	✓	4			Up to £800,000
H Young Structures Ltd	01953 601881			●	●	●	●	●			●			●	●	✓	4	✓	●	Up to £3,000,000
Had Fab Ltd	01875 611711				●				●	●	●				●	✓	4			Up to £3,000,000
HBE Services Ltd	01525 854110				●	●				●				●	●	✓	2			Up to £800,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●	✓	2			Up to £3,000,000
Hillcrest Structural Steel Ltd	023 8064 1373			●	●	●	●	●		●	●			●	●	✓	3		●	Up to £3,000,000
Intersteels Ltd	01322 337766	●			●	●	●	●	●	●			●	●	●	✓	3	✓		Up to £3,000,000
J & A Plant Ltd	01942 713511				●	●									●		4			Up to £40,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●				●	●					4			Up to £6,000,000*
Kiernan Structural Steel Ltd	00 353 43 334 1445	●		●	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	●	Above £6,000,000
Kloekner Metals UK Westok	0113 205 5270												●			✓	4		●	Up to £6,000,000
Leach Structural Steelwork Ltd	01995 642000			●	●	●	●	●			●					✓	2		●	Up to £6,000,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●				●	●	●			●	●		2			Up to £800,000
Littleton Steel Ltd	01275 333431				●					●	●			●	●	✓	3			Up to £1,400,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●			●	●	✓	4		●	Up to £1,400,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●		3			Up to £2,000,000
Mackay Steelwork & Cladding Ltd	01862 843910			●	●		●			●	●			●	●	✓	4			Up to £1,400,000
Maldon Marine Ltd	01621 859000				●	●			●	●	●				●	✓	3			Up to £1,400,000
Mifflin Construction Ltd	01568 613311			●	●	●	●				●						3			Up to £3,000,000
Murphy International Ltd	00 353 45 431384	●			●		●	●	●		●				●	✓	4			Up to £2,000,000
Newbridge Engineering Ltd	01429 866722	●	●	●	●	●	●	●			●	●				✓	4		●	Up to £2,000,000
North Lincs Structures	01724 855512			●	●					●	●				●		2			Up to £400,000
Nusteel Structures Ltd	01303 268112						●	●	●	●				●		✓	4		●	Up to £6,000,000
Painter Brothers Ltd	01432 374400	●			●				●	●	●				●	✓	3			Up to £6,000,000*
Peter Marshall (Steel Stairs) Ltd	0113 307 6730				●	●				●	●				●	✓	3			Up to £1,400,000*
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		3			Up to £1,400,000
REIDsteel	01202 483333			●	●	●	●	●	●	●	●	●	●		●	✓	4		●	Up to £6,000,000
SAH Luton Ltd	01582 805741			●	●	●				●	●			●	●		2			Up to £400,000
S H Structures Ltd	01977 681931	●		●	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	●	Up to £3,000,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●			●	●			●	●	✓	4			Up to £2,000,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	●	Above £6,000,000
Severfield Nuclear and Infrastructure Limited	01204 528393	●		●	●	●	●	●	●		●					✓	4			Above £6,000,000
Shaun Hodgson Engineering Ltd	01553 766499	●		●	●		●			●				●	●	✓	3			Up to £800,000
Shiplely Structures Ltd	01400 251480			●	●	●	●		●	●	●			●	●	✓	2			Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●	●	●	●			●				●		2	✓		Up to £2,000,000
Southern Fabrications (Sussex) Ltd	01243 649000				●	●				●	●			●	●	✓	2			Up to £1,400,000
Steel & Roofing Systems	00 353 56 444 1855	●		●	●	●	●				●	●		●	●	✓	4			Up to £4,000,000
Taziker Industrial Ltd	01204 468080	●		●	●		●			●	●		●	●	●	✓	3		●	Above £6,000,000
Temple Mill Fabrications Ltd	01623 741720			●	●					●	●				●	✓	2			Up to £400,000
Traditional Structures Ltd	01922 414172			●	●	●	●	●	●		●			●	●	✓	3	✓	●	Up to £2,000,000
TSI Structures Ltd	01603 720031			●	●	●	●	●			●			●			2	✓		Up to £2,000,000
Underhill Engineering Ltd	01752 752483				●		●	●	●	●	●			●	●	✓	4	✓		Up to £3,000,000
W I G Engineering Ltd	01869 320515				●					●	●			●	●	✓	2		●	Up to £400,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✓	4			Above £6,000,000
Westbury Park Engineering Ltd	01373 825500	●		●	●	●	●	●	●	●	●				●	✓	4		●	Up to £800,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	●	Above £6,000,000





# Steelwork contractors for bridgeworks



The Register of Qualified Steelwork Contractors Scheme for Bridgeworks (RQSC) is open to any Steelwork Contractor who has a fabrication facility within the UK or European Union.

Applicants may be registered in one or more category to undertake the fabrication and the responsibility for any design and erection of:

- FB** Footbridges
- CF** Complex footbridges
- SG** Sign gantries
- PG** Bridges made principally from plate girders
- TW** Bridges made principally from trusswork
- BA** Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)
- CM** Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 metre span)
- MB** Moving bridges
- SRF** Site-based bridge refurbishment
- FRF** Factory-based bridge refurbishment
- AS** Ancillary structures in steel associated with bridges, footbridges or sign gantries (eg grillages, purpose-made temporary works)
- QM** Quality management certification to ISO 9001
- FPC** Factory Production Control certification to BS EN 1090-1  
1 - Execution Class 1    2 - Execution Class 2  
3 - Execution Class 3    4 - Execution Class 4
- BIM** BIM Level 2 compliant
- SCM** Steel Construction Sustainability Charter  
● = Gold   ● = Silver   ● = Bronze   ● = Certificate

**Notes**

(1) Contracts which are primarily steelwork but which may include associated works. The steelwork contract value for which a company is pre-qualified under the Scheme is intended to give guidance on the size of steelwork contract that can be undertaken; where a project lasts longer than a year, the value is the proportion of the steelwork contract to be undertaken within a 12 month period.

Where an asterisk (\*) appears against any company's classification number, this indicates that the assets required for this classification level are those of the parent company.

BCSA steelwork contractor member	Tel	FB	CF	SG	PG	TW	BA	CM	MB	SRF	FRF	AS	QM	FPC	BIM	NHSS 19A	20	SCM	Guide Contract Value <sup>(1)</sup>
Adey Steel Ltd	01509 556677	●		●	●	●	●				●	●	✓	3			✓	●	Up to £3,000,000
AJ Engineering & Construction Services Ltd	01309 671919	●			●	●	●	●	●	●	●	●	✓	4				●	Up to £3,000,000
Billington Structures Ltd	01226 340666	●		●	●	●	●					●	✓	4	✓	✓	✓	●	Above £6,000,000
Bourne Group Ltd	01202 746666	●		●	●	●				●	●	●	✓	4	✓		✓	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓	●	Up to £6,000,000
Cairnhill Structures Ltd	01236 449393	●	●	●	●	●	●	●			●	●	✓	4			✓	●	Up to £6,000,000
Cementation Fabrications	0300 105 0135	●		●	●	●	●					●	✓	3			✓	●	Up to £6,000,000
D Hughes Welding & Fabrication Ltd	01248 421104	●		●		●			●	●	●	●	✓	4			✓		Up to £400,000
Donyal Engineering Ltd	01207 270909	●		●					●	●	●	●	✓	3		✓	✓	●	Up to £1,400,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●		●			●	✓	4				●	Up to £3,000,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●	●	●		●	●	●	●	✓	3			✓	●	Up to £2,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●			●	●				●	●	●	✓	4	✓		✓	●	Above £6,000,000
M Hasson & Sons Ltd	028 2957 1281	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓	●	Up to £1,400,000
Millar Callaghan Engineering Services Ltd	01294 217711	●		●	●	●	●	●	●	●	●	●	✓	4			✓	●	Up to £1,400,000
Murphy International Ltd	00 353 45 431384	●	●	●	●	●	●					●	✓	4			✓	●	Up to £2,000,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £6,000,000
REIDsteel	01202 483333	●		●		●	●	●				●	✓	4				●	Up to £6,000,000
S H Structures Ltd	01977 681931	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓		✓	●	Up to £3,000,000
Severfield plc	01204 699999	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	✓	✓	●	Above £6,000,000
Shaun Hodgson Engineering Ltd	01553 766499											●	✓	3					Up to £800,000
Taziker Industrial Ltd	01204 468080	●		●	●	●	●	●	●	●	●	●	✓	3		✓	✓	●	Above £6,000,000
Underhill Engineering Ltd	01752 752483	●	●	●	●	●				●	●	●	✓	4	✓		✓	●	Up to £3,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	✓	✓	●	Above £6,000,000
<b>Non-BCSA member</b>																			
Allerton Steel Ltd	01609 774471	●	●	●	●	●	●	●			●	●	✓	4	✓		✓	●	Up to £3,000,000
Carver Engineering Services Ltd	01302 751900	●		●	●	●	●		●	●	●	●	✓	4			✓		Up to £3,000,000
Centregreat Engineering Ltd	029 2046 5683	●		●	●	●	●	●	●	●	●	●	✓	4					Up to £3,000,000
Cimolai SpA	01223 836299	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓	●	Up to £1,400,000
Eiffage Metal	00 33 388 946 856	●	●	●	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000
Harrisons Engineering (Lancashire) Ltd	01254 823993			●	●	●	●	●	●	●	●	●	✓	3		✓			Up to £1,400,000
Hollandia Infra BV	00 31 180 540 540	●	●	●	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000*
HS Carlsteel Engineering Ltd	020 8312 1879									●	●	●	✓	3			✓		Up to £800,000
In-Spec Manufacturing Ltd	01642 210716									●	●	●	✓	4			✓		Up to £800,000
J&D Pierce Contracts Ltd	01505 683724	●		●	●	●	●	●	●	●	●	●	✓	4			✓		Above £6,000,000
Kelly's Welders & Blacksmiths Ltd	01383 512 517											●	✓	2			✓		Up to £200,000
Lanarkshire Welding Company Ltd	01698 264271	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £3,000,000
Malin Group	0141 370 5467	●			●	●	●			●	●	●	✓	4			✓		Up to £4,000,000
North View Engineering Solutions Ltd	01325 464558											●	✓	3					Up to £800,000
Smulders Projects UK Ltd	0191 295 8700	●	●	●	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000
Tecade S.A.U.	00 34 955 833 811			●	●	●	●	●	●			●	✓	4		✓	✓		Up to £6,000,000
Total Steelwork & Fabrication Ltd	01925 234320	●		●		●				●	●	●	✓	3			✓		Up to £3,000,000
Victor Buyck Steel Construction	00 32 9 376 2211	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000



## Corporate Members

Corporate Members are clients, professional offices, educational establishments etc which support the development of national specifications, quality, fabrication and erection techniques, overall industry efficiency and good practice.

Company name	Tel	Company name	Tel	Company name	Tel
Gene Mathers	0115 974 7831	MMC Engineer Ltd	01423 855939	Structural & Weld Testing Services Ltd	01795 420264
Griffiths & Armour	0151 236 5656	Paul Hulme Engineering Ltd	07801 216858	SUM ADR Ltd	07960 775772
Highways England Company Ltd	0300 123 5000	QHSE-Interspect Ltd	07438 413849		
Keiths Welding Limited	07791 432 078	Sandberg LLP	020 7565 7000		





# Industry Members

Industry Members are those principal companies involved in the direct supply to all or some Steelwork Contractor Members of components, materials or products. Industry member companies must have a registered office within the United Kingdom or Republic of Ireland.

**QM** Quality management certification to ISO 9001  
**FPC** Factory Production Control certification to BS EN 1090-1  
 1 Execution class 1 2 Execution class 2  
 3 Execution class 3 4 Execution class 4  
**NHSS** National Highway Sector Scheme

**CA** Conformity Assessment  
 UKCA and/or CE Marking compliant, where relevant:  
**M** manufacturer (products UKCA and/or CE Marked)  
**D/I** distributor/importer (systems comply with the CPR)  
**N/A** CPR not applicable

**SCM**  
 Steel Construction Sustainability Charter  
 ● = Gold ● = Silver  
 ● = Bronze ● = Certificate

**SfL**  
 Steel for Life Sponsor

Structural components							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Albion Sections Ltd	0121 553 1877	✓	M	4			
BW Industries Ltd	01262 400088	✓	M	3			
Cellbeam Ltd	01937 840600	✓	M	4	20		
Composite Profiles UK Ltd	01202 659237		D/I				
Construction Metal Forming Ltd	01495 761080	✓	M	3			
Daver Steels Ltd	0114 261 1999	✓	M	3			
Farrat Isolevel	0161 924 1600	✓	N/A				
FLJ Structures	01452 722200	✓	M	4	20	●	
Hadley Industries Plc	0121 555 1342	✓	M	4		●	
Hi-Span Ltd	01953 603081	✓	M	4		●	
<b>Jamestown Manufacturing Ltd</b>	<b>00 353 45 434288</b>	✓	M	4	20		Gold
Kingspan Structural Products	01944 712000	✓	M	4		●	
MSW UK Ltd	0115 946 2316		D/I				
Prodeck-Fixing Ltd	01278 780586	✓	D/I				
Structural Metal Decks Ltd	01202 718898	✓	M	4			
Stud-Deck Services Ltd	01335 390069		D/I				
Tata Steel - ComFlor	01244 892199	✓	M	4			
<b>voestalpine Metsec plc</b>	<b>0121 601 6000</b>	✓	M	4		●	Gold

Computer software							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Autodesk Ltd	01252456600		N/A				
Fabsec Ltd	01937 840641		N/A				
Idea Statica UK Ltd	02035 799397		N/A				
StruMIS Ltd	01332 545800		N/A				
Trimble Solutions (UK) Ltd	0113 887 9790		N/A				

Steel producers							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
British Steel Ltd	01724 404040	✓	M		3B		
Tata Steel - Tubes	01536 402121	✓	M		3B		

Manufacturing equipment							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Behringer Ltd	01296 668259		N/A				
<b>Cutmaster Machines (UK) Ltd</b>	<b>07799 740191</b>		N/A				Silver
<b>Ficpep (UK) Ltd</b>	<b>01924 223530</b>		N/A				Silver
Kaltenbach Ltd	01234 213201		N/A				
Lincoln Electric (UK) Ltd	0114 287 2401	✓	N/A				
Peddinghaus Corporation UK Ltd	01952 200377		N/A				

Membership services							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Deconstruct UK Ltd	02035 799397	✓	N/A				

Protective systems							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Forward Protective Coatings Ltd	01623 748323	✓	N/A				
<b>Hempel UK Ltd</b>	<b>01633 874024</b>	✓	N/A				Silver
Highland Metals Ltd	01343 548855	✓	N/A				
International Paint Ltd	0191 469 6111	✓	N/A				
Jack Tighe Ltd	01302 880360	✓	N/A		19A		
Joseph Ash Galvanizing	01246 854650	✓	N/A				
PPG Architectural Coatings UK & Ireland	01924 354233	✓	N/A				
Sherwin-Williams UK Ltd	01204 521771	✓	N/A			●	
Vale Protective Coatings Ltd	01949 869784	✓	N/A				
<b>Wedge Group Galvanizing Ltd</b>	<b>01902 601944</b>	✓	N/A				Gold

Safety systems							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
easi-edge Ltd	01777 870901	✓	N/A			●	
TRAD Hire & Sales Ltd	01614 304666	✓	N/A				

Steel stockholders							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
AJN Steelstock Ltd	01638 555500	✓	M	4			
<b>Arcelor Mittal Distribution - Scunthorpe</b>	<b>01724 810810</b>	✓	D/I	4	3B		Headline
<b>Barrett Steel Services Limited</b>	<b>01274 682281</b>	✓	M	4	3B		Headline
British Steel Distribution	01642 405040	✓	D/I	4	3B		
<b>Cleveland Steel &amp; Tubes Ltd</b>	<b>01845 577789</b>	✓	M	3	3B		Gold
Dent Steel Services (Yorkshire) Ltd	01274 607070	✓	M	4	3B		
Dillinger Hutte U.K. Limited	01724 231176	✓	D/I	4		●	
Duggan Profiles & Steel Service Centre Ltd	00 353 567722485	✓	M	4			
Kloekner Metals UK	0113 254 0711	✓	D/I	4	3B	●	
Murray Plate Group Ltd	0161 866 0266	✓	D/I	4	3B		
<b>National Tube Stockholders Ltd</b>	<b>01845 577440</b>	✓	D/I	4	3B		Gold
Rainham Steel Co Ltd	01708 522311	✓	D/I	4	3B		
The Alternative Steel Co Ltd	01942 826677		D/I				

Structural fasteners							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
BAPP Group Ltd	01226 383824	✓	M		3		
Cooper & Turner Ltd	0114 256 0057	✓	M		3		
Lindapter International	01274 521444	✓	M				
<b>Tension Control Bolts Ltd</b>	<b>01978 661122</b>	✓	M		3		Silver

Welding equipment and consumables							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Air Products PLC	01270 614167		N/A				

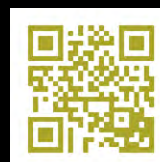


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