

# REINFORCE

JOURNAL OF THE BRITISH ASSOCIATION OF REINFORCEMENT

2019

Is your welded  
reinforcement  
CARES approved?

**Heavyweight  
alternative to  
air-conditioning**

Reinforcing health  
and safety

**BAR members  
go large!**

Get connected

**Shear innovation**

Fires question use of  
timber construction

**Taking cage  
fabrication to  
the next level**



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# RAISE THE BAR

FOR REINFORCED SUCCESS  
CHOOSE A MEMBER OF  
THE BRITISH ASSOCIATION  
OF REINFORCEMENT



- CARES APPROVED
- COMMITTED TO HEALTH AND SAFETY
- RAISING STANDARDS
- COMMITTED TO SUSTAINABILITY
- RESPONSIBLY SOURCED
- DELIVERING QUALITY AND ADDED VALUE
- PRODUCT INNOVATION AND PROCESS DEVELOPMENT



BAR MEMBERS: GIVING YOUR PROJECT A REINFORCED ADVANTAGE

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# REINFORCE

## 2019

## Welcome

A prime objective of the British Association of Reinforcement and its members is the continued advancement of health and safety and industry best practice. In response to the introduction of new CARES steel welding requirements, all BAR members have undertaken the necessary considerable investment in staff training, new welding procedures and testing regimes to ensure that they offer welded reinforcement that is of the highest standard. It is of some industry concern that there are some reinforcement fabricators, not affiliated to BAR, who are yet to seek or gain full CARES steel welding approval. We take this opportunity to remind them of their responsibilities.

In addition to responding to new industry requirements, BAR has developed and implemented its own health and safety initiatives for the betterment of the reinforcement sector as a whole. These include the publication of new welding ventilation guidelines and new guidelines on controlling shear line noise. They are added to the library of health and safety publications all of which are available to the industry as free downloads.

Another area where members aim to 'raise the bar' is in developing and delivering innovative new products and efficient construction solutions. This issue of Reinforce includes a range of product and project case studies that prove how, from the smallest rebar coupler to the largest supply of quality assured reinforcement, BAR members are committed to delivering reinforcement manufactured and fabricated to the highest standards.

This commitment furthers the use of reinforced concrete, whose unrivalled and inherent, performance benefits of free, built-in fire resistance, thermal efficiency, sound insulation, and minimum vibration to name but a few, raises the bar over other lightweight construction choices.

Stephen Elliott  
Chairman of the British Association of Reinforcement

The British Association of Reinforcement (BAR) is the industry association for UK Manufacturers and fabricators of steel reinforcement products including cut-and-bent and mesh.

BAR aims to add value to the reinforcement industry via market and product development, the promotion of health and safety as well as social value and environmental best practice and providing a forum to help forward the reinforced concrete industry as a whole.

BAR is a member of CARES and all BAR members are CARES approved.

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# IS YOUR WELDED REINFORCEMENT CARES APPROVED?

Clients and contractors are warned to ensure that their reinforcement has been welded by a fabricator who is fully certified to the new CARES steel welding Technical Appendices 11 and 12. If not, then their reinforcement is not CARES approved.

All fabricator members of the BAR are fully approved by CARES for welding of steel reinforcement to the new Technical Appendices. They have undertaken considerable investment in training and new procedures in order to achieve approval. There is some concern that a number of reinforcement fabricators, not affiliated to BAR, have yet to seek or gain approval.

The new CARES requirements cover welding to the International Standard ISO 17660 and the new British Standard BS 8548:2017 "Guidance for arc welding of reinforcing steel". The previous appendices and the associated BS 7123: 1989 "Specification for metal arc welding for concrete reinforcement" have been withdrawn.

The main changes of the new ISO and British Standard are more rigorous testing including more tensile and shear tests, new regular production tests in addition to the weld procedure and welder qualification tests, plus new requirements for designated welding co-ordinators.

The changes address the continued growth in welded pre-fabrication. Pre-fabrication is a value-added product that dispenses with costly, time consuming traditional fixing methods and has become common for pile cages, beam cages and roll mat reinforcement. However, this growth calls for greater awareness of how pre-fabricated reinforcement can be adversely affected by inappropriate welding techniques or procedures.

"BAR members are to be congratulated for their investment in staff training, development of new procedures and the implementation of new testing regimes. They are leading the reinforcement sector in offering assurance that their pre-fabricated reinforcement is of the highest standard", said Stephen Elliott, BAR's Chairman.

## THE CARES RESPONSE

CARES is responding strongly to the concerns that some pre-assembled welded fabrication manufacturers have falsely claimed CARES approval by using steel from CARES approved sources, when they only had approval for cutting and bending to BS 8666. In such cases pre-assembled welded fabrications supplied by these firms are not covered by their CARES approval. "There had been 'isolated cases' involving clients receiving welded

reinforcement from CARES approved fabricators not in possession of a valid CARES approval," explained Lee Brankley, CARES chief executive. "It is vital that welding of reinforcement is undertaken by approved welders in accordance with specifications which are independently evaluated by CARES."

To reduce any confusion CARES is amending its wording on product conformity certificates for fabricators not in possession of a valid CARES approval to SRC Appendix 11 and 12. The new wording states: "Exclusion note – Any rebar welded at this location is NOT covered by the CARES Steel for the Reinforcement of Concrete Scheme."

In addition, CARES is undertaking an education campaign to advise firms of these changes and is introducing random checks to adherence to the new requirements, with tough sanctions for breaches.

Streamlining the process and mitigate costs in the specification of approved manufacturers should help. To help firms clarify requirements, the suggested wording for specifications reads:

### **Welding activities:**

"Only firms that have achieved certification to CARES Appendix 11 - Quality and operations assessment schedule for the manufacture of pre-assembled welded fabrications using welded joints to BS EN ISO 17660 and BS 8548 under factory conditions, shall be permitted to bid for or undertake contracts to supply pre-assembled welded fabrications."

### **Semi-structural / structural welding activities:**

"Only firms that have achieved certification to CARES Appendix 12 -Quality and operations assessment schedule for the manufacture of pre-assembled welded fabrications using welded semi-structural and/or structural joints to BS EN ISO 17660 and BS 8548 under factory conditions, shall be permitted to bid for or undertake contracts to supply pre-assembled tack welded fabrications."

**Note: Evidence of compliance with the above should be requested for submission with contract bids.**

To determine the scope of approval of a firm check the CARES List of Approved Firms at: [www.ukcares.com](http://www.ukcares.com)



# HEAVYWEIGHT ALTERNATIVE TO **AIR-CONDITIONING**



This July was the hottest on record and it is suggested that, due to climate change, it provided an indication of summers to come. The resultant rising demand for energy-guzzling, carbon emission emitting air-conditioning calls for developers, designers and occupiers to examine the potential of heavyweight construction to reduce bills and carbon emissions.

The irony of air-conditioning is that its use contributes to the hotter summers that are predicted as a result of climate change. The hotter the summer the more that air-conditioning is turned-up. The more air-conditioning, the more CO<sub>2</sub> emissions. BRE calculates that air-conditioning already equates to 10% of UK energy consumption.

However, there is a simple alternative. Use the thermal mass of heavyweight concrete construction to provide energy-free cooling.

Greater use of the potential of concrete thermal mass which, when used in combination with night-time cooling, can reduce or even eliminate the need for air-conditioning. Often referred to as Fabric Energy Storage (FES), the basic approach is to expose the soffit of concrete floor slabs which can then absorb heat gains during warm weather and so reduce the internal temperature. The use of cooler night-time air ventilation or embedded water-cooling cools the soffits in readiness for the following day. The best level of thermal mass is provided by heavyweight construction. Lightweight construction such as steel and timber structures do not offer a comparable level of heat absorption.

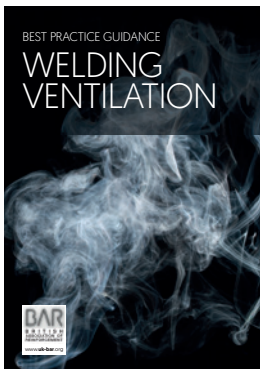
FES thermal mass, especially when used as part of an integrated passive design solution that includes building orientation, shading and natural ventilation, can reduce significantly the reliance on air-conditioning and in return reduce the level of carbon emissions. Given the considerable amount of energy that air-conditioning uses, designers and developers should actively embrace the potential of concrete and choose heavyweight construction over lightweight construction particularly when, according to the Carbon Trust, the energy costs and association carbon emissions of a typical air-conditioned building are 30% higher than a naturally ventilated building. The air-conditioned building is also more likely to have increased capital and maintenance costs.

The use of concrete construction does raise questions concerning the level of embodied CO<sub>2</sub> when compared to other structural materials. Some passively cooled buildings will have an initial higher embodied CO<sub>2</sub>. However, that will be quickly offset by the reductions in ongoing operational CO<sub>2</sub> which can range from just one to six years.

# REINFORCING HEALTH AND SAFETY

As part of its objective to forward the UK reinforcement sector, BAR has developed and published a number of new health and safety guides that cover a wide range of industry issues. Copies of the guides may be downloaded free-of-charge from BAR's website [www.uk-bar.org](http://www.uk-bar.org)

## NEW WELDING VENTILATION GUIDE



This best practice guidance is intended for reinforcement suppliers and fabricators in order to provide a safe working environment for all those involved in the welding of steel reinforcement. The guidance aims to avoid the potential health hazards resulting from exposure to welding fumes and explains how mechanical ventilation can limit over

exposure to the fumes and gases resulting from cutting and welding by removing those fumes and gases from the welder's breathing zone.

It includes:

- Outline of main welding processes for steel reinforcement
- Description of potential fume hazards
- Examination of natural and mechanical ventilation

The guidance offered relates generally to the welding of carbon steel reinforcement and whilst the same principles apply to the welding of stainless steel and galvanised reinforcement further advice should be sought when welding these materials.

The welding process produces a visible smoke that contains harmful metal fume and gas by-products. The fume may include a number of metal particles such as: arsenic, beryllium, chromium, iron, lead, manganese, titanium, vanadium and zinc, the most common elements in steel reinforcement being iron and manganese with chromium, nickel, copper and vanadium to a much lesser extent.

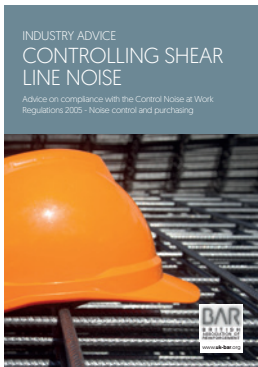
Gas by-products may include: argon, nitrogen, nitrogen oxides, carbon dioxide and carbon monoxide.

Health effects of exposure to and breathing welding fume and smoke include:

- Acute exposure can result in eye, nose and throat irritation, dizziness and nausea
- Prolonged exposure may lead to lung damage and various type of cancer
- Possible side effect of metal fume fever, kidney damage and stomach ulcers
- Prolonged exposure to manganese can result in Parkinson-like symptoms
- Helium, argon and carbon dioxide displace oxygen in the air and can lead to suffocation
- Carbon monoxide gas can result in asphyxiation.

Given the above serious hazards, it is imperative that employers and welders are fully aware of the steps that they should take to reduce exposure to the welding fume and that welding areas are well ventilated.

# SHUSH! REBAR SHEAR LINE NOISE GUIDANCE



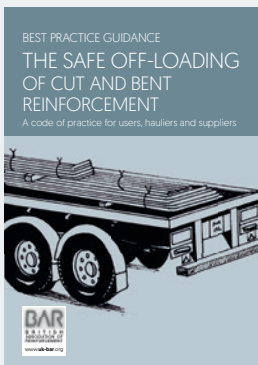
BAR has published a new guide on noise control of reinforcement shear line machines. The guide, 'Controlling Shear Line Noise', was produced in association with the noise and vibration inspectorate of the Health and Safety Executive (HSE).

Shear line machines with no noise control can produce noise levels of around 95dB(A)

at the shear-line operators position. This means that anyone operating a shear-line with no noise control is likely to be above The Control of Noise at Work Regulations 2005 action limit value after just 45 minutes of operation.

The guide outlines the duties and responsibilities of employers. These include assessment of the noise risk, mitigation of noise and ongoing maintenance of noise control equipment, provision of staff training, hearing protection and ongoing health surveillance. The guide also forwards a comprehensive range of noise control solutions and measures that should be undertaken to ensure that noise levels are as low as is practically possible. Importantly, the guide recommends dialogue between rebar fabricators and their shear line suppliers to ensure that shear line plant has built-in noise control measures. Under the Supply of Machinery Regulations 2008 manufacturers of shear line are obliged to provide machinery with minimal operational noise, full information about noise risk and necessary operator training. In particular, the guide recommends that rebar companies adopt the HSE's Buy Quiet Scheme.

# SAFE OFF-LOADING OF CUT-AND-BENT REBAR



The safe off-loading of cut and bent reinforcement guide is aimed at reinforcement suppliers, hauliers, and customers to ensure that all those involved in the off-loading of cut and bent reinforcement from delivery vehicles are fully aware of safe working practices. The revised guide covers the planning for

safe off-loading, the delivery plan, and the preparation of the load for off-loading. In particular, the guide points out potential hazards and offers best practice advice on how to avoid them.

Due to the potential risks involved, the guidance emphasises that the movement of cut and bent reinforcement should be the subject of a risk assessment and safe system of work appraisal that takes full consideration of each individual delivery location. The off-loading procedures and equipment outlined in the guide include those known to be in regular use.

# ARCELORMITTAL WINS GOLD AT CANNES

'We Choose the Safest Way', a health and safety film has won a Gold Medal at the Cannes Corporate Media & TV Awards in Cannes, France. To view the film visit: <https://www.youtube.com/watch?v=N7Z2-mqyG-M>

The film was first aired internally at ArcelorMittal's annual Health and Safety Day in April 2018, but it was so well received that ArcelorMittal decided to publish the movie externally. Since May it received almost 48,000 views on YouTube.

The film tells the true and tragic story of Max and is read out by unsuspecting employee volunteers from around the world who represented all levels of seniority within the company.

Robin Paulmier, ArcelorMittal's head of corporate health and safety commented: "The company has

been organising an annual group-wide health and safety day for over a decade and although it has achieved a significant improvement in health and safety performance over that time, achieving our ultimate aim of being an injury-free workplace has proved elusive. To drive further progress toward this goal, the health and safety committee and I felt a fresh, personal and highly emotional message might encourage us all to stop and think about workplace safety in a way no other film has."

According to Paulmier, the movie achieved its goal 'beyond all expectation'. He said it touched colleagues and film industry professionals. He said: "Congratulations and sincere thanks to everyone involved in this project, particularly our employee volunteers who connected with Max's story with genuine emotion and gave this film its impact."



# BAR MEMBERS GO LARGE!

Express Reinforcements supplied the 5000 tonnes of reinforcement for the largest concrete pour in UK history for the Bouygues-Laing O'Rourke joint venture at Hinkley Point C. The 9,000m<sup>3</sup> concrete pour for beats the previous record set by the Shard in London. Completion of the concrete base for the first reactor means construction of nuclear buildings above ground can now begin in earnest.



**Express**  
Reinforcements

The Bouygues-Laing  
O'Rourke joint venture at  
Hinkley Point C.

Meanwhile at One Nine Elms in Vauxhall, London, on behalf of Careys Civil Engineering, BRC has completed one of its largest continuous concrete pours ever – installing 1,400t of rebar reinforcement for a concrete pour of 4,852m<sup>3</sup>.

One Nine Elms - which consists of the rising 43-storey River Tower and 56-storey City Tower – will create over 730,000 ft<sup>2</sup> of residential space, 267,000 ft<sup>2</sup> of hotel accommodation and 1,000 ft<sup>2</sup> of retail outlets.



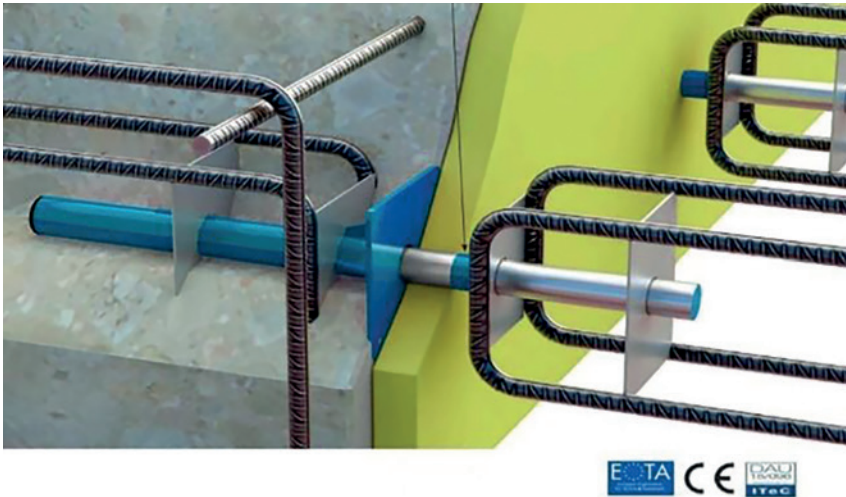
One Nine Elms in Vauxhall,  
London







# GET CONNECTED



with an ETA document in the structural connectors' field.

The Geoconnect Shear Dowel Connector has been awarded a DAU (*Document of Assessment for fitness of Use*) when used to transfer shear loads between concrete structural elemental beams, slabs or floors to walls, and piles or supports without relative displacements.

The proof is in the pudding. Interspan has specified Geoconnect Shear Dowel for the CityLabs 2.0 project in Manchester. The building is being constructed as a reinforced concrete frame with PT slabs.

Interspan specified the system due to its buildability, ease of installation, and clear well laid out load data. The colour co-ordination gave confidence in the correct installation of the two components. The concrete frame contractor Heyrod cast the female section as part of the first pour, and this is later connected to the male section as part of the subsequent pour. The shear dowels allow movement between the plates whilst carrying the large loads imposed by the design, safely and securely. Heyrod expressed their satisfaction with the supply chain, delivery, packaging and clear identification of sizes due to the colour identification of the units. The addition of the steel framework around the dowel allowed for easier installation on site.

In exclusive partnership with SFB, RFA-Tech has launched the Geoconnect Shear Dowel Connector to the UK construction market. A CE marked product designed to carry large loads across expansion and contraction joints in concrete structures safely and efficiently, the Geoconnect Shear Dowel Connector is easy to install as well as being a cost-effective alternative to the more traditional methods of construction, such as slab-to-slab, corbels, keyed joints or floor-to-column connections.

Each Geoconnect Shear Dowel Connector comprises of two locally welded reinforced pieces, a dowel bar and sleeve to allow movement on both sides of the construction joint. The additional rectangular sleeve allows both longitudinal and lateral movement to be accommodated, which is particularly important for corner situations, internally and externally. Available in five diameters, the connector is a vital addition to an engineer's design option being compatible with a range of concrete strengths, expansion/contraction joints, widths and floor thicknesses. It also has excellent mechanical properties, has a high resistance to corrosion and is available in both stainless steel and mild steel HDG.

Geoconnect® Fire elements are included in the ETA 16/0064 Approval (CE marking) and can, therefore, be used where fire protection is required. They are the first solution certified



Citylabs 2.0, Manchester

# SHEAR INNOVATION

Expansion joints are a common way of allowing controlled movement in reinforced concrete structures and so prevent cracking within the concrete. In large concrete members, this poses the question: how to ensure the load transfer from one side of the joint to the other? Gerhard Bumés of MAX FRANK provides an example of successfully solving this challenge.

Great Eastern Quays is a mixed-use masterplan for a 6.2ha site and forms part of the Royal Albert Basin area at the eastern end of the Royal Docks complex. The scheme is being marketed as Royal Albert Wharf and seeks to enhance the East Beckton community by delivering an integrated, high quality and sustainable residential-led, mixed use development that takes advantage of the river and dockside setting.



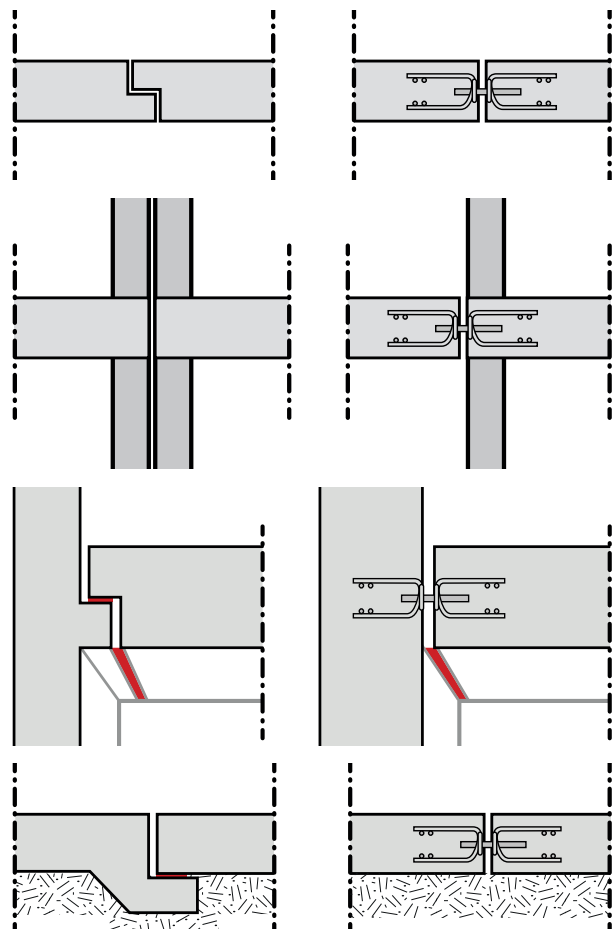
Great Eastern Quays

The masterplan has been designed around three distinct character areas; the Dockside, the Riverfront and the residential heart. The design challenge for this development was to allow movement in a large footprint podium slab. Several buildings consisting of smaller footprints were designed above the underground car park. This resulted in the podium slab being partially situated within the external area, and partially within the internal area. The location of the movement joints were designed by Structural Engineers at Conisbee to allow movement longitudinally and laterally in the plane of the slab. Any vertical movement in the slab was to be resisted.

Traditional RC construction uses corbels or downstands as the most common method of transferring loads across a joint. Additional columns can be used to separate concrete members. These methods, which fulfil all requirements for allowing movement and transferring the load, come with some significant disadvantages:

- Complicated reinforcement details.
- Complex formwork required, which can affect the construction programme.
- Downstands are visually not appealing.
- Additional columns and downstands involve further materials and costs.

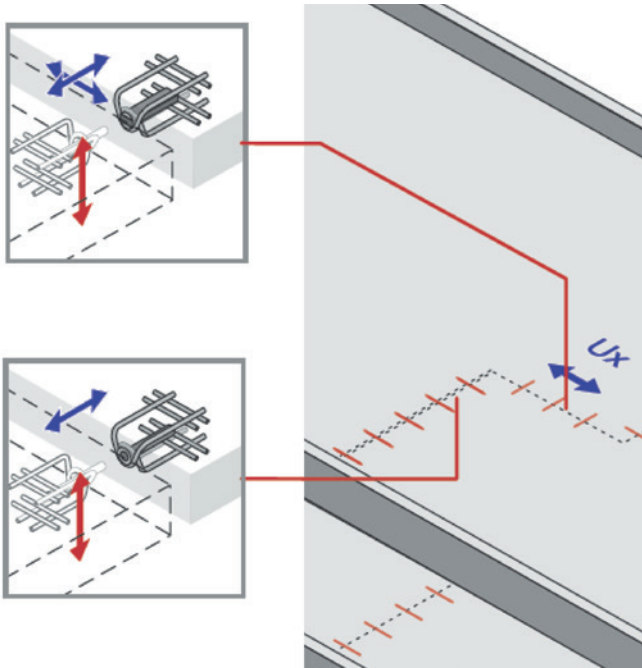
Therefore, in modern concrete construction, shear dowels are commonly used as a time and cost saving method. These engineered products consist normally of a dowel bar, with corrosion protection [as the joint is not serviceable at a later stage], and some form or anchoring body that allows the efficient transfer of the load into the concrete member. Enabling the challenge to be solved in a more efficient way with the use of shear dowels.



Traditional construction Vs modern solution Egcodorn.



In many cases, such as the Great Eastern Quays project, a change in direction of the movement joints is required – posing a further design challenge. Therefore, in addition to shear dowels for longitudinal movement, MAX FRANK developed the 'Q-type' Egcodorn for transverse movement. This product allows sideways movements with the use of a rectangular dowel sleeve instead of the usual round sleeve.



*Egcodorn shear transfer within a concrete slab*

During the course of the project, MAX FRANK's technical team worked closely with Conisbee to optimise the design. Egcodorn's high grade steel core, enclosed by a stainless steel airtight shell, allows the transfer of extremely high loads. In this case, each dowel was designed to transfer 370kN at a joint opening of 20mm. The dowel centres were set at 800mm in accordance with the design guidelines, as provided by the design software. Then the slab reinforcement was optimised to allow transfer from the patented anchoring body of the Egcodorn into the slab.



*Egcodorn shear dowel with patented 'anchoring' technology*

As an additional challenge, the project required 2 hours fire protection in the movement joints, which was achieved with fire collars positioned around the dowels. These fire collars are easy to install on site and are tested to provide a fire rating of R120. The installation of the product on site was supported by layout drawings. The product is easy to install, due to a headplate welded to the female part of the Egcodorn, which can be nailed to the formwork.



*Shear connector headplates are installed*

After pouring the first pour, the male part is connected, slab reinforcement is installed and the second section is poured.



*Male part of the shear dowel is connected*

During the Great Eastern Quays project, a total length of just over 230 linear metres of expansion joints were designed and built with this innovative way of construction. As well as making the design easier, the use of Egcodorn shear dowels enabled the project team to progress the development according to the planned schedule. As this project demonstrates, shear dowels are considered as a great advancement in modern concrete frame construction, for all parties involved.

# FIRES QUESTION THE USE OF **TIMBER CONSTRUCTION** INSIDE AND OUT

A number of fires earlier this year has again raised questions over the suitability of timber as a construction material.



*Fire rips through the timber cladding and balconies*

The major fire at Riverside Barking this summer provided a further example of why timber is not a suitable construction material whether built or under construction, structural or decorative. The fire at the De Pass Gardens flats quickly spread from the first floor to the sixth floor via the external feature timber balconies. Residents had raised concerns about fire risk of the balconies. Of the fire, resident Michaela Gheorghie tweeted: "Fire on the Barking Riverside estate. Huge!!! Serious!!! Only a couple of weeks after the residents association specially asked the builders @Bellway\_Homes who said the wood cladding was fire retardant and perfectly safe." She went on to tell the BBC that she had 'raised several issues' about the safety of the wooden balconies on the blocks of flats.

In May, an investigation by BBC Watchdog found that hundreds of timber-framed homes built by Persimmon and Bellway 'are a fire risk'. The Persimmon homes were sold with missing or incorrectly installed fire barriers. BBC Watchdog also reported on fire safety issues with Bellway's Canterbury's Tannery timber-framed development. In 2015, a fire took hold in a block of flats and quickly spread through dozens of properties, destroying or damaging 45 of them. An inspection highlighted concerns over fire stopping in the walls, leading the residents having to be moved out while improvement works were carried out.

"The fire at Riverside Barking and the BBC Watchdog programme shows that the fire risk of timber construction does not go away once the building is completed," said Stephen Elliott, BAR chairman. "Timber is a combustible material, concrete is not. Concrete construction offers up to six hours fire resilience compared with the 30 minutes for timber frame."

The fast spread of timber fires was underlined by the devastating fire at the Beechmere retirement development in Crewe that resulted 150 elderly residents losing their homes as the three storey timber framed building has collapsed. Asst Ch Fire Officer, Gus O'Rourke said he was "extremely shocked" at how quickly the fire had spread and that a "stay put" policy for residents in the complex was quickly abandoned due to the speed with which the fire spread.

It is not just completed timber-frame buildings that cause concern. Elliott pointed to two major fires at timber-frame construction sites earlier this year at St.Marys Road, Southampton and at Olympia Street, Glasgow. He said: "The fire-risk of timber frames under-construction is widely recognised and has resulted in the timber industry having to develop special site guidelines for their prevention. Now the risk with completed timber clad buildings is under focus."



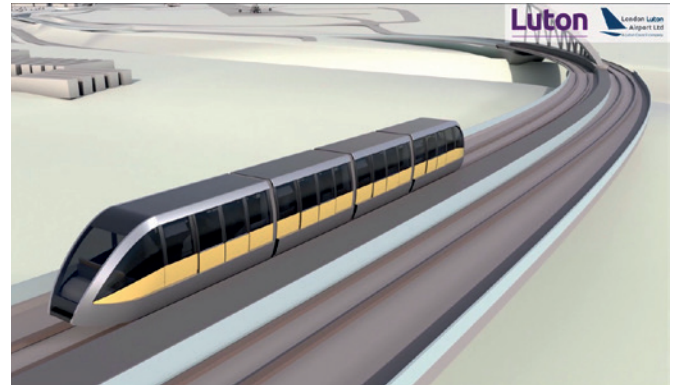


# DARTING AHEAD

Rom Ltd are supplying 6,000 tonnes of Reinforcing Bar to VolkerFitzpatrick-Kier, on the state-of-the-art £225 million Luton DART project, a fast transit system linking London Luton Airport with Luton Airport Parkway railway station.

The Luton DART will be a double-shuttle, fully-automated people-mover (APM) based on latest system technology and design innovation, and capable of operating 24 hours a day, seven days a week. The cable-driven system is energy efficient and environmentally friendly. The project's civils works will be undertaken by VolkerFitzpatrick-Kier joint venture and the transportation system by Doppelmayr Cable Car UK Ltd.

The project has full planning permission from Luton and Central Bedfordshire councils, and is on track to be ready for operation by in 2021. It will create 500 construction jobs over three years, 30 apprenticeships, and 17 permanent positions. Cllr Hazel Simmons, Leader of Luton Council, said: "The Luton DART will benefit



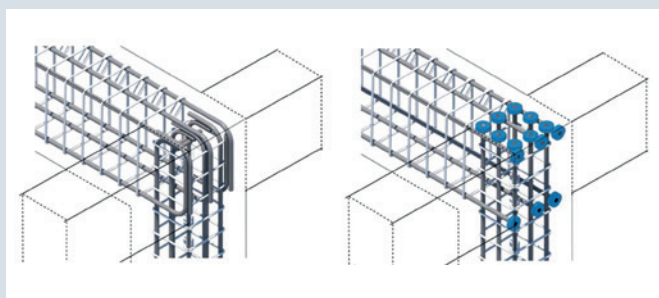
not only airport passengers but also the people and businesses of Luton, in that it supports our ambitions to secure long-term economic growth and ensure local people have access to high-quality employment opportunities. We are all looking forward to the Luton DART opening in 2021."



## NEW HEADED REINFORCEMENT ANCHORS DESIGN GUIDE

New design guidance could further the use of headed reinforcement anchors in the UK. While headed reinforcement anchors are widely used in some parts of the world, their use in Europe has to date been limited. This is mainly because of the lack of design provisions contained within Eurocode 2 as well as a lack of European product standards and certification schemes.

With this in mind Dextra have recently collaborated with Ove Arup & Partners to produce a headed reinforcement anchor design guide. The document 'Methodology for Designing with Headed Reinforcement Anchors to Eurocode 2' is exclusively available from Dextra and gives a step by step guide for designing to Eurocode 2.

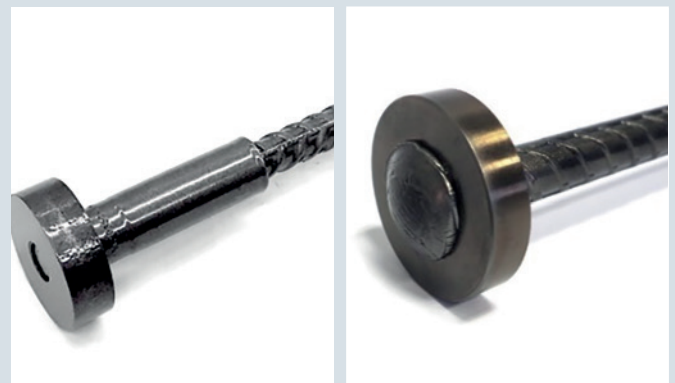


Extract from the guide: headed reinforcement anchors replacing traditional anchorage reinforcement at a beam-column junction

Dextra supplies two CARES certified headed bar products:

**Griptec headed reinforcement** is available for rebar diameters 12mm to 50mm and ideal for main reinforcement anchorage.

**HF headed reinforcement** is ideal for shear links and other reinforcement which needs to be first processed via an automatic cut and bend line. They are available for rebar diameters 10mm to 20mm.



Dextra Griptec Headed Reinforcement

Dextra HF Headed Reinforcement

For further information visit: [www.dextragroup.com](http://www.dextragroup.com)

# TAKING CAGE FABRICATION TO THE NEXT LEVEL

ArcelorMittal Construction Solutions have fabricated and delivered some of the most complex and ambitious prefabricated cages ever delivered to a UK construction site. Having already manufactured the reinforcement



cages for the diaphragm walls for the Tidweay Chamber Wharf Shaft, AMCS was awarded the contract to fabricate and deliver the 300 tonne inverted dome of reinforcement for the shaft base slab.

The inverted dome consist of eight “pie-slice” segments, each weighing around 28 tonnes and measuring over 9m long and wide, over 3m high. They were constructed using custom made jigs to ensure precise connection between the elements in the bottom of the shaft on site. Central dished mats were then added to complete the construction. The entire base comprised of these prefabricated elements was delivered by barge from AMCS’ Chatham dock base directly to the construction site.

Installation on site was completed by the self-delivery team of the client CVB [a joint venture of Costain, Vinci Construction Grands Projets, and Bachy Soletanche] in 10 working shifts – twice as fast as had been programmed.

In addition to the obvious programme benefits, pre-fabricating the reinforcement off site has been driven by a Health and Safety initiative to minimise time spent working in the base of the 60m deep shaft.

To follow on from this success, the AMCS team are currently constructing the prefabricated reinforcement for the elements that will form the tunnel portals and the lining walls for inside the shaft. These three portals, each containing in excess of 120 tonnes of reinforcement, are being pre-fabricated in five or six sub elements, each with multiple layers of 32mm and 40mm bars precisely located and fixed to ensure seamless fit when positioning on site.

The base units, which are the largest sections, are over 5m tall, 3m deep at the widest point and over 17m long. They are fabricated from mainly 32mm and 40mm bars and all weigh in excess of 30 tonnes. Similar to the base slab reinforcement, the portal reinforcement segments are being delivered by barge to site.

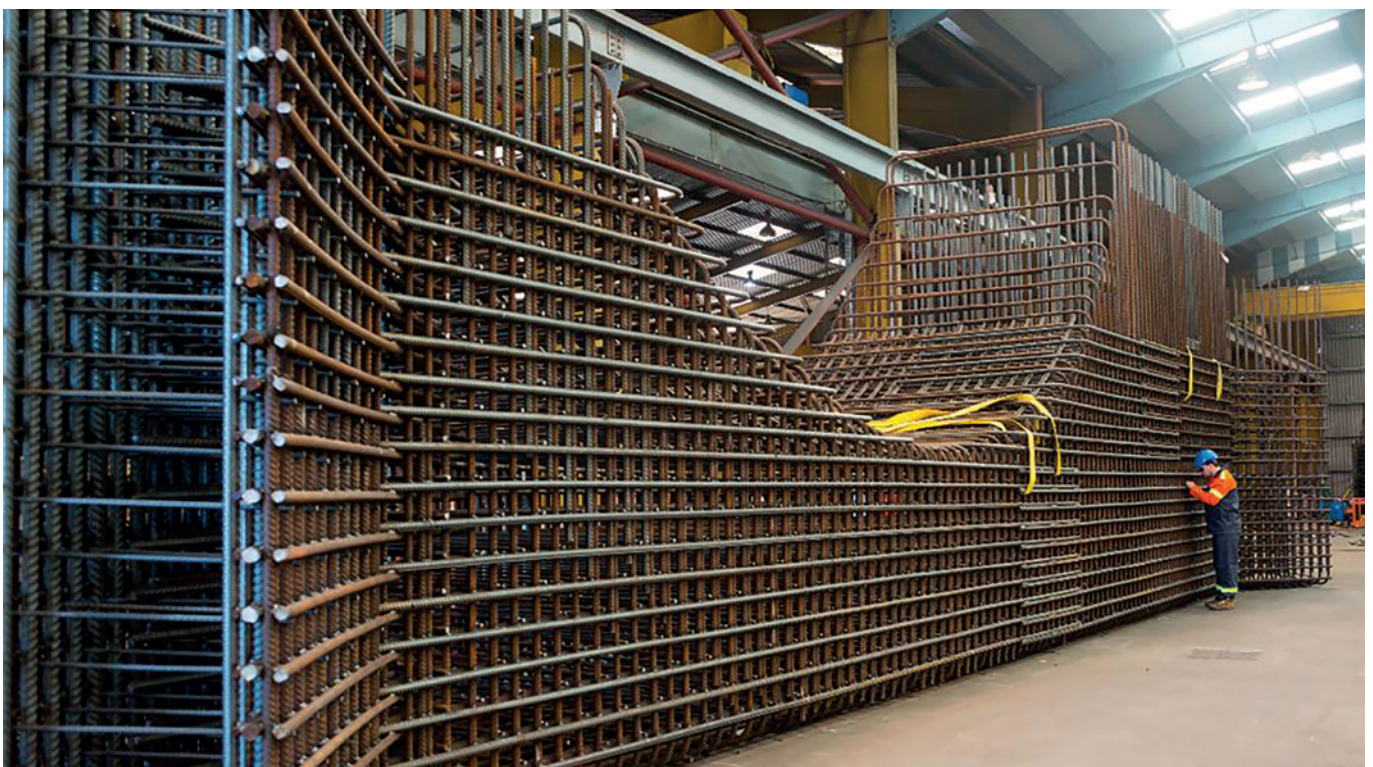
Finbarr Lynch, operations manager for ArcelorMittal Construction Solutions said: “Our work at Chambers Wharf for CVB has been a perfect example of the





successful collaborative working and a reasonable lead time that allowed for cooperation in design, detail, fabrication and logistics management. The successful delivery of such a complex concept is testimony to the great trust that has been engendered between all parties, Tideway, Mott McDonald, CVB, the technical team at AMCS, Total Ship Services and to the skills of the AMCS production teams”.

Phil Taylor, AMCS chief executive, said: “This is magnificent achievement from the whole team in ArcelorMittal, from design and detailing, production and quality assurance through to logistics. The level of dedication and commitment from my team has been extraordinary and has certainly tested the limits of the skills in the team, and these skills have exceeded expectations to a point where I’m looking forward to next big challenge.”





# CELSA

## SUPPORTING THE FUTURE OF LOW CARBON ENERGY

Hinkley Point C is the first of a new wave of nuclear power stations to be built in the UK for over 20 years. The ambition for this project is to not only secure the future of UK energy consumption but also help reduce carbon emissions by providing a source of low carbon-electricity for UK consumers.



CELSA Steel UK have been working alongside their downstream businesses as well as the Hinkley Point C, joint venture team, BYLOR, to supply over 208,000 tonnes of reinforcing steel to this historic project. As a result, all of the reinforcing material supplied will be 100% UK sourced and will have a 98% recycled content. Coupled with these credentials, the material will also be certified to the responsible sourcing standard BES 6001 and the responsible sourcing standard for reinforcing steel, Eco-Reinforcement.

Due to the proximity of the project site to CELSA's mill in Cardiff, CELSA are strategically placed to help minimize the overall carbon emissions associated with this project,

as all of the reinforcing steel supplied will travel less than 200 miles from mill to construction site.

Construction and operation of Hinkley Point C will create 25,000 employment opportunities, up to 1,000 apprenticeships. There are currently over 4,000 workers on site and it is anticipated that it will provide low-carbon electricity for around 6 million homes. Marking a significant milestone in the revitalization of the UK's nuclear power industry, Hinkley Point C will make a major contribution to the UK's move to achieve carbon neutrality by 2050.



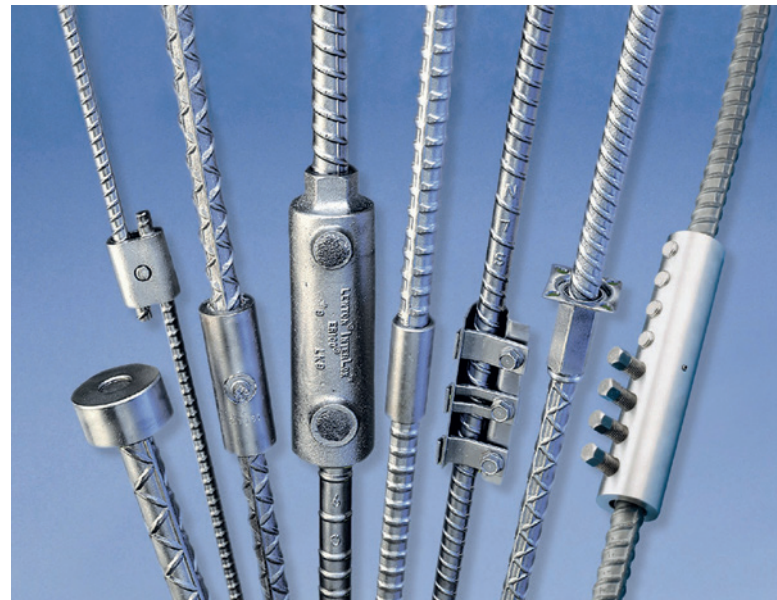
# MAKING **CONSTRUCTION** MORE EFFICIENT, FASTER AND SIMPLER

Contractors want products that makes construction, more efficient, faster and simpler. In this project revisit, we see how the use of nVent Lenton couplers for the Thameslink Station Box provided just that.

The Thameslink Station Box was part of Section 2 of the construction of the St. Pancras Station and St. Pancras Chambers works of the Channel Tunnel Rail Link. It was completed in June 2005 as a prerequisite to the completion of the St Pancras Station which was finished in 2007.

Bachy Soletanche Limited, the piling contractor, installed more than 2,000 piles on the job which was purported to be one of Britain's most complex foundation contracts. The piling contractor was part of the joint venture contractor CORBER, which included Costain, O'Rourke, Bachy Soletanche and Emcor Rail. Large diameter cast-in-place piles with high reinforcement densities formed the sidewalls of the Thameslink Box. The walls were both secant and contiguous and piles were typically 1,200 mm to 1,800 mm in diameter and 30m deep. As a consequence of the high reinforcement densities [up to 400 kg/m<sup>3</sup>] on a number of the large diameter tension piles, the engineer specified that couplers should replace tension laps on T40 and T50 bars.

For this reason, Bachy Soletanche used 5,000 Erico nVent LENTON P13 positional couplers in the piling operations. The couplers were used to splice the bars where the ongoing bar was restricted in its axial movement and adjustability of the coupler was required. There were typically 100 couplers in each of the piles. Pile cages were prefabricated and supplied to the site in a maximum of 14.0 m lengths due to craneage, transportation and site logistic restrictions. When the cage sections arrived on site, each cage element already had one end of the coupler installed. A full pile cage was then completed by splicing the three separate elements vertically over the pile bore, prior to concreting. Each element was very rigid when tack welded. This was one of the factors that prompted the



use of a tapered thread. Due to the critical nature of the relative bar spacings within the three cage elements, they were also fabricated in one length and then dismantled for transportation purposes.

According to Bachy Soletanche, the nVent LENTON threaded couplers were versatile, quick to use and easy to handle. The piling operations also incorporated a number of reducer couplers (40 to 50 mm and 32 to 50 mm), which were specially made to specifications and delivered within 14 days of order. nVent LENTON P13 reducer couplers splice different diameter bars together when neither bar can be rotated. In addition to the P13 couplers, CORBER used P14, R11, D14, and A12 Lenton taper-threaded mechanical couplers. The different types of couplers were used in pile cages, beam, column applications and roof-slab connections.

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## REINFORCE YOUR PROJECT'S SUCCESS



# RAISING THE BAR



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BAR members are fully supportive of the Association's objectives aimed at raising the bar for the UK reinforcement sector by:

- Providing a forum in which common issues facing the UK reinforcement industry can be addressed.
- Forwarding and supporting the market share of reinforced concrete against competitive structural materials.
- The Association cannot dictate material sourcing but expects its members to, wherever possible, to forward and support the UK steel and reinforcement sectors.
- Improving overall quality of the product and service within the UK reinforcement industry, through representation on the Board of CARES (Certification Authority for Reinforcing Steels) and on relevant BSI Technical Committees.
- Improving the health and safety record of the UK reinforcement industry.
- Improving the environmental record of the UK reinforcement industry.
- Actively promoting the UK reinforcement industry's products and capabilities to relevant target audiences.
- Representing the UK reinforcement industry with HM Government, in Europe and with other decision makers.

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