REINFORCE

JOURNAL OF THE BRITISH ASSOCIATION OF REINFORCEMENT

2017

Reinforce your responsible sourcing

Effective fabricator solutions

The true cost of reinforcement

New welding standard and training

Heavyweight future proofing

BAR
BRITISH ASSOCIATION OF REINFORCEMENT

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REINFORCE 2017

Welcome

It's all about commitment. The last year has seen the British Association of Reinforcement and its members continue their commitment to forward the UK reinforcement sector.

As the industry's focal point, BAR is reviewing and updating its library of health and safety guidance, is actively involved in British and European standard development, is promoting good sustainability practice and encouraging responsible sourcing.

Meanwhile, BAR's members are committed to on-going programmes of investment and improvement that aim to give their clients' projects a reinforced advantage thanks to innovative and effective construction solutions, product development and added-value.

In this issue of Reinforce we discuss how BAR's members are well placed to meet the latest procurement guidance from government and major contractors. Responsible sourcing is the mainstay of this guidance and it is here that BAR members aim to lead the way. They also lead the way with their high-level commitment to good health and safety practice, sustainability, quality products and innovative solutions. By being enshrined in the BAR constitution, these commitments are integral to BAR and its members.

In this age of immediate gratification and distraction, commitment may be regarded as an old-fashion virtue. However, it is a virtue that BAR members give a modern twist to.

Stephen Elliott,
Chairman, British Association of Reinforcement

The British Association of Reinforcement (BAR) is the trade association of UK manufacturers and fabricators of steel reinforcement products including cut and bent bar and mesh.

BAR aims to add value to the reinforcement industry through market and product development, promotion of good industry and health and safety practices and forwarding the development of the reinforced concrete industry as a whole.

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

Raising the BAR

FIRST CHOICE FOR RESPONSIBLE SOURCING

UK steel reinforcement is well placed to meet the requirements of the new procurement guidance for responsible sourcing.

Towards the end of 2016 the government published new guidance to UK public sector bodies advising them to consider the social and economic benefits of procuring UK steel for projects below £10 million. This extended the procurement guidance issued in the spring of 2016 for major projects above £10 million. The guidance was produced in order to create a level playing field and so assist the domestic steel industry against the influx of cheap foreign imports. It includes a number of factors that should be taken into account when procuring steel. These include the consideration of social and environment characteristics covering core health and safety requirements and a focus on training and provision of employment for the long-term unemployed. There is also a focus on whole life cost not the lowest purchase price and a call for the exclusion of suppliers who have breached environmental standards.

The government's emphasis on UK procurement has been matched by the private sector with BuildUK, the construction contractors' association, publishing its own guidance. This underlines the commitment that BuildUK members have "to providing opportunities for British-based steel producers to support local economies, create jobs and reduce carbon emissions from transport." In particular, the guidance recommends that BuildUK members should consider a number of factors on steel procurement including adherence to British standards and European Directives, compliance with recognised responsible sourcing schemes, positive environmental outcomes associated with shorter delivery distances and support for local employment and training opportunities.

Responsible sourcing is the mainstay of the procurement guidance. It is here that UK rebar sector can lead the way due to its local availability of materials, short supply chains, regulated management systems and manufacture from 98% recycled scrap metal. In addition, the sector is served by two responsible sourcing schemes – Eco-Reinforcement and the CARES Sustainable Reinforcing Steel Certification scheme - both of which are accredited to BRE's BES 6001 Framework Standard for the Responsible Sourcing of Construction Products. Both schemes provide the reinforced concrete supply chain with a methodology and external accreditation to ensure that accurate environmental data is provided and that the reinforcement is fully traceable. Furthermore, the sector can emphasise it ethical credentials as it is subject to and upholds all relevant national and European employment and workers' rights, health and safety and environmental regulations. Plus all BAR members report data to the annual Concrete Sustainability Strategy which sets out achievement targets for a wide range of sustainable objectives.

To assist with UK procurement and to determine the origin of rebar, BAR recommends checking the rib markings. This will include its CARES approval mark, country of origin, its manufacturer and grade. The number of ribs between the CARES approval mark and the manufacturer's mark relates to the country of origin. For UK manufactured reinforcement there is a 5 rib gap, for France a 3 rib gap and for Germany a 1 rib gap. For rebar manufactured beyond Europe, such as Chinese, there is a 9 rib gap. Understanding and checking the identification system will assist with the determining the country and mill of manufacture. This identification is important are there is no European or International standard for the responsible sourcing of construction products outside of the UK.

The procurement guidance is more than just a step in the right direction to assist the UK steel industry. It makes good business sense. It underlines a commitment to a quality product with a transparent, traceable supply chain with a low carbon footprint and ethical benchmarks. Such responsible sourcing has long been a membership requisite for the reinforcement manufacturing and fabricating members of BAR.

celsa steel UK
CELSA GROUP

KNOW WHERE YOUR REBAR COMES FROM

Over the last few years the term 'Responsible Sourcing' has rapidly become a widely discussed and important issue within the construction sector, especially when it comes to sourcing materials for projects.

Increasingly contractors are becoming aware that the sourcing and origins of their building products is a key issue, as more clients include and specify 'locally sourced' as a stipulation within their procurement policies. This issue has become especially prevalent for steel reinforcement producers and suppliers, following the significant levels of non-European rebar imports flooding UK Construction Market during 2015. With these imports overwhelming the UK market, it became increasingly difficult for customers to identify the origins of their bars as well as to certify that the material had been responsibly sourced.

As a key player within the UK reinforcement steel market, and currently the only domestic supplier of the material, CELSA identified that there was a clear need to provide its customers with the confidence in knowing where their products had been sourced from.

Aside from the CARES bar mark, which is rolled onto every piece of rebar, there was no quick confirmation of determining the source of each reinforcing product that the customer had purchased. After consulting with their engineering team within their Rod and Bar Mill in Cardiff, CELSA chose to adopt a mark which could be rolled onto every bar and bar in coil to help provide a definitive and quick confirmation of the source of each reinforcing product that the customer had purchased.

Since early 2016 CELSA have led the way by rolling the "UK" mark onto the surface of all diameters of steel reinforcement bar and coil in order to aid the identification process, and give on-site personnel extra assurance that they are using sustainable, local and responsibly sourced material. Through this, CELSA UK can give their customers, and their customers' customers, full supply chain traceability. From recycled scrap metal processor to construction site all material is completely traceable.

This combined with the fact that CELSA UK products contain 98% recycled content and are all produced from 100% UK sourced recycled scrap metal, guarantees the most responsibly sourced and produced reinforcing steel for the UK construction industry.

For further information visit: **www.celsauk.com**

THE BAR GUIDE TO STEEL REINFORCEMENT

There is a wide range of standards, codes and regulations that effect the specification and use of reinforcement steel. BAR has published a 'Guide to Steel Reinforcement Standards and Codes'. Aimed at both the designer and specifier, the guide provides an overview of the standards and codes that effect the specification and use of steel reinforcement.

In addition, the guide provides a short-term and long-term view on the impact of Brexit on reinforcement standards and advice on CE marking.

'Guide to Steel Reinforcement Standards and Codes' is available as a free download from **www.uk-bar.org**

NEW WELDING STANDARD

The new British Standard BS 8548:2017 "Guidance for arc welding of reinforcing steel" is relevant for welding reinforcing steels which themselves comply with the requirements of BS 4449 "Steel for the reinforcement of concrete- Weldable reinforcing steel- bar, coil and decoiled product- Specification" and BS 4482 "Steel wire for the reinforcement of concrete products – Specification".

This guidance document is designed to be used in conjunction with the International Standards ISO 17660-1 "Welding of reinforcing steel – Part 1- Load bearing welded joints" and ISO 17660-2 "Welding of reinforcing steel – Part 2- Non-load bearing joints". In conjunction with the new British Standard, CARES have issued new Appendices to their Steel for the Reinforcement of Concrete (SRC) Scheme; Appendix 11 covers "tack" or "locational" joints (as covered by ISO 17660 Part 2), and Appendix 12 covers structural and semi-structural joints, (as covered by ISO 17660 Part 1). Between them, these new documents contain significant new requirements for the control of welding processes for reinforcing steel.

The main changes within the UK compared with previous practice are:

- The requirements for testing are more comprehensive, and include more tensile and shear tests, as well as the conventional weld macro and hardness tests.
- Regular production tests have been introduced, in addition to the weld procedure tests and welder qualification tests.
- The requirements for Welding Co-ordinators have been introduced. The requirements cover the roles of both a Responsible Welding Coordinator, and a Company Welding Coordinator.
- Recommendations and guidance on friction welding have been introduced.

ENSURING YOUR COMPANY MEETS NEW WELDING COORDINATOR REQUIREMENTS

Launch of new training course

A new four-day training course for Company Welding Coordinators has been launched following the publication of the new British Standard BS 8548:2017 'Guidance for arc welding of reinforcing steel'. The new standard requires that each site has a designated Company Welding Coordinator who has overall on-site technical responsibility for welding operations.

The comprehensive course syllabus is industry relevant by being based on the latest requirements of ISO 17660 and CARES Appendices 11 and 12. It covers the range of responsibilities of the Company Welding Coordinator, background on the manufacture and metallurgy of reinforcing steels, common welding processes, the structure of welded joints, plus testing, inspection and supervision of welding processes. The course is focused on factory-based MMA and MAG welding processes.

Upon completion, delegates will have a thorough knowledge of the requirements of BS8548, ISO 17660 and the relevant CARES appendices. They will be fully able to supervise both personnel in the welding workplace and pre-fabrication welding operations.

The four-day course, delivered by Tony Franks of R-Tech Materials and Mark Cozens of Weld Class Solutions, will run from 15th to 18th May 2017 at the Village Hotel, Cardiff. The course fee is £1,050 plus VAT and includes all course materials, lunch and refreshments. Hotel accommodation is not included. The course is limited to 12 delegates to ensure maximum interaction and learning opportunities. For further information and booking visit: **www.rtech-materials.co.uk/welding-course-overview/**

The need for this course

The need for the course results from the continued growth in welded pre-fabrication being undertaken by UK reinforcement fabricators. Pre-fabrication is seen as a value-added product that dispenses with costly, time-consuming traditional fixing methods. As a result, welded pre-fabrication has become common for pile cages, beam cages and roll mat reinforcement. The growth in welded pre-fabrication has called for greater awareness of how reinforcing steels can be adversely affected by inappropriate welding technique or procedures.

The previous British Standard for welding reinforcing steels, BS 7123:1989, was superseded by ISO standard BS EN 17660 Parts 1 and 2: 2008. This introduced a new requirement for fabricators conducting welding of reinforcing steels to have a suitably qualified welding co-ordinator. In January 2017, the new British Standard BS 8548:2017 'Guidance for arc welding of reinforcing steel' was published. In conjunction with this new standard, CARES have issued new Appendices to their Steel for the Reinforcement of Concrete (SRC) Scheme. Appendix 11 covers 'tack' or 'locational' joints whilst Appendix 12 covers structural and semi-structural joints.

Between them, these documents contain significant new requirements for the control of reinforcing steel welding processes including the requirement for a Company Welding Coordinator. Whilst the standard recommends that a coordinator should be qualified to CSWIP 3.1 or CSWIP Welding Quality Control Coordinator it should be noted that although having value the CSWIP courses are not specific to reinforcing steel.

It is this gap that the new course aims to address by providing specifically tailored training for those Company Welding Coordinators involved with the manufacture of welded pre-fabrication of reinforcing steels to BS 8548: 2017.

BOOST FOR **WELSH STEEL**

The British Association of Reinforcement has welcomed the investment of £11.55million in the Welsh steel industry.

The Welsh government has announced an investment of £2.8 million into Code Serve in Brynmawr, Blaenau Gwent, Dyfed Steels in Llanelli, Carmarthenshire, and BAR members Express Reinforcements in Neath and Celsa Steel in Cardiff. This is in addition to the £8.75 million being invested by the companies themselves in new facilities, equipment and expansion projects.

A £1.6m investment in Celsa Manufacturing's two sites in Cardiff will go towards 'major environmental improvements', while 50 new jobs are being created at Code Serve, in Brynmawr, following an expansion and relocation plan supported by Welsh Government funding. In Neath, 22 jobs are being safeguarded at Express Reinforcements, thanks £150,000 investment in new machinery and a £65,000 grant from the Welsh Government. Dyfed Steels is investing more than £4m in a new manufacturing facility, which is backed by £750,000 of Welsh Government support, and will create 30 new jobs, as well as safeguarding 200 more.

The investment by the Welsh government and by steel manufacturing and fabrication companies will create up to a hundred new jobs and safeguard the future of many hundreds more. This is a welcomed boost for the Welsh steel industry against what continues to be a challenging market.

STEEL 2020 VISION WELCOMED

A blueprint for the future of the UK's steel industry set out in a new report by a cross-party group of MPs and Leeds University Business School could be the way forward for the UK steel industry.

The report, 'Steel 2020', published by the All Party Parliamentary Group on Steel and Metal Related Industries, is based on testimony collected from industry experts ranging from business leaders, R&D specialists and the workforce, through to the European Commission, international trade body representatives, politicians, and local authorities.

It identifies seven key areas of policy and regulatory reform as recommendations for the Government to incorporate into its industrial strategy:

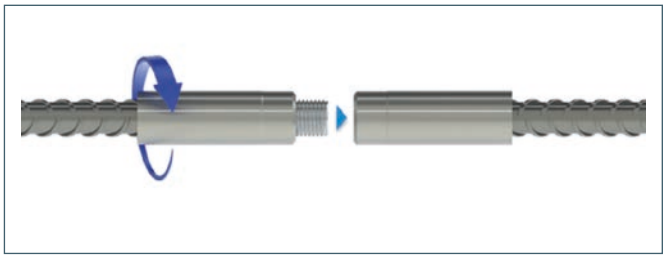
1. A radical reshaping of the energy market to reduce uncompetitive energy costs faced by the steel industry, improving energy efficiency and spreading out the burden of decarbonisation policies.
2. Ensuring free and fair international trade by developing a clear UK post-Brexit trade strategy to minimise uncertainty. This should include trade defence instruments against Chinese dumping, as well as maintaining single market access vital to steel and related sectors such as automotive.
3. A positive procurement policy to ensure domestic steel is used as far as possible in public projects, including enforceable rules and greater use of the 'Kite Mark' certification system
4. A national review of business rates, removing the perverse incentives that punish investment in capital by steel producers, while compensating Local Authorities to ensure no loss of income.
5. Supporting supply and value chains within steel and the wider manufacturing sector. The Government should take a more strategic view, incentivising key areas of supply chains to re-shore in the UK so fewer steel products are exported abroad for final processing.
6. For advanced economies like the UK, industry needs constant innovation to improve productivity and remain competitive. The Government must take a strategic role in supporting R&D and upskilling of the workforce, while also ensuring support for skills retention and "short time working" tied to training and up skilling, enabling companies to respond to fluctuations in the market without cutting jobs. The report calls on the government to provide support for investment by creating a National Bank for industry. A 'Steel Catapult' is essential to provide a base for new ideas and the report calls on the Government to override vested interests to support this.
7. A more collaborative relationship between industry and the trade unions, working together to develop a national industrial strategy which includes worker representation on boards. The report also calls on the Government to provide financial support for mothballing in incidents of plant closure and for the workers made redundant to ensure skills are not lost.

Commenting on the report, Steve Elliott, BAR Chairman, said: "The vision of 'Steel 2020' is welcomed. What would be even more welcomed is that vision becoming a reality".

100% PROOF

Approved by CARES to TA1-A, TA1-B and TA1-C and used in construction projects in the UK and around the world, the Dextra Griptec rebar coupler system is the only 100% proof tested rebar coupler system where each and every connection to the rebar is systematically proof tested during the rebar end preparation procedure.

The Griptec Rebar Coupler System



Sleeves are extruded onto the rebar and systematically proof loaded during the rebar end preparation.

The use of rebar coupler systems or mechanical rebar splices as an alternative to lapping in concrete is widespread. In the UK, the introduction of BS 8597: 2015 'Steel for the reinforcement of concrete – Reinforcement couplers – Requirements and test methods', has led to a welcome standardization of rebar coupler testing and performance requirements. However, it is increasingly acknowledged that specifying BS 8597 and CARES approval, may not in itself be sufficient for some structures, as BS 8597 contains no minimum splice ductility requirement and no categorization of tensile performance.

The ductility of rebar to BS 4449 is measured by the value of percentage elongation at maximum force (Agt), which is a measure of uniform plastic elongation along the entire length of the rebar before necking occurs. Given the limitations of BS 8597, the only way of ensuring sufficient ductility of the coupler and rebar assembly, is to specify the additional requirement of a "bar break system to BS 8597", as this guarantees that ultimately it is the rebar that breaks outside the influence of the coupler. This is also the only way to guarantee that the full ductility of the rebar assembly is maintained. Griptec is a full "bar break to BS 8597" system where BS 4449 Grade 500 rebar is specified.

A "bar break system to BS 8597" ensuring the ductility (Agt) of the rebar is maintained.

Fully computerized state of the art machinery is used to extrude the Griptec sleeve onto the rebar, eliminating human error and allowing high productivity. The machine is fully enclosed and uses no lubricants, leading to a clean and safe working environment for the single operator. It also has low operational costs and is very quickly reconfigured to change from one rebar diameter to another. On site, there is no need to apply any specific torque to the assembly and a visual inspection of all joints is sufficient.

Due to its "bar break to BS 8597" performance and high quality control via systematic proof loading, together with the high productivity, safety and cost advantages of rebar end preparation and "no torque" assembly requirement on site; the Dextra Griptec rebar coupler system is fast becoming the choice for consultants, rebar fabricators and contractors alike. It continues to be supplied to major construction projects across the UK, Southbank, Place, 1 Blackfriars and Battersea Power Station, to name but a few.

For further information visit: **www.dextragroup.com**

Dextra Group

SIMPLE AND **EFFECTIVE**

An innovative solution to the positioning of the dense reinforcement required for the foundation shaft of the renovated Whitechapel Station, part of the Crossrail project, demonstrated that the complex and difficult can be made simple and efficient.

The renovation of the Whitechapel station, part of the Vinci Grand Project C512 Crossrail contract carried out in partnership with Balfour Beatty, Tony Gee & Partners and Arcelor Mittal Construction Solutions, called for the digging of a 30m shaft. The density of the 1000sq m x 2,100mm thick foundation raft was particularly complex both in terms of installation (40mmn diameter bars with 3,200mm long lap lengths) and for subsequent concreting and vibration (bars spaced only 150mm apart with 50% overlap of upper raft).

Using Eurocode 3 as inspiration, the team forwarded a variant for positioning the bars. Rather than being lapped as per the traditional method, within the reinforcement layers the bars would be simply 'butted' with the butt ends being staggered rather aligned. The different layers are then connected using splice bars.

This approach allowed the reinforcement panels to be pre-assembled and then positioned by crane. This reduced the number of on-site required steel fixers and eliminated the risks associated with manual handling and working at height. In addition, butting the bars made it possible to use standard concrete and vibration processes and allowed the foundation raft to be completed in just seven weeks.

For further information visit: **www.amcs.uk.net**

EXPRESS REINFORCEMENT NAMED **PREFERRED BIDDER FOR £100m** HINKLEY POINT C

BAR member Express Reinforcements has been named as the preferred bidder for a 200,000 tonnes reinforcement order for the Hinkley Point C project.

The forthcoming order, will be placed by the Bouygues and Laing O'Rourke joint venture main contractors, is understood to be potentially worth over £100m. Reinforcement will be supplied from Express Reinforcement's Neath and Newport manufacturing centres using bar supplied by CELSA Steel in Cardiff thereby minimising the transport carbon footprint.

Martin Westbury, project director BYLOR said: "The Bouygues TP/Laing O'Rourke joint venture is delighted at the prospect of working with Express Reinforcements as our preferred supplier to the Hinkley Point C project. The choice supports our strategy of working with the UK supply chain wherever possible, using UK-sourced materials." He continued: "BYLOR is currently working closely with EDF Energy to prepare the site at Hinkley Point C for the main construction programme, so that when full Governmental approval is received, work can commence in earnest without delay."

Andy Lodge, Managing Director of Express Reinforcements said: "We are pleased to be the preferred supplier of reinforcing steel to this contract through BYLOR. It underlines our proven track record to deliver highly valued, local, responsibly-sourced steel to the highest quality standards (Eco-Reinforcement/BES 6001)."

For further information visit:
www.expressreinforcements.co.uk

PROVIDING REINFORCEMENT SOLUTIONS TO BIM LEVEL 2

Express Reinforcements' drive for continual improvement in the way that steel reinforcement is detailed, fabricated, assembled and placed on site through collaboration has been borne out by it being involved in some of the most demanding and complex construction projects in the UK with Express currently supplying some of the most important nuclear, building and infrastructure projects across the UK. With many of today's building projects being constructed in built up urban city locations, with limited storage and delivery window restrictions, the industry is fast requesting more 'off site' manufacture of prefabricated steel reinforcement.

The company's focus on buildability solutions has resulted in the creation of its own in-house delivery analysis programme. Working with contractors as part of an integrated team, Express use the programme to map the value stream in order to identify and remove waste from design, detailing, manufacture, assembly and placement.

For the Crossrail Farringdon Station project, complex and heavily congested steel reinforcement design intent was received from the contractor and re-detailed by the Express in-house technical team using 3D building information modelling software. The 3D object model was produced where it was interrogated via different views to ensure that measurements/dimensions were accurate, couplers were placed at the correct centres, there was no clash, concrete was able to flow and the reinforcement solution proposed was buildable. Prior to assembly a temporary works design check was carried out to ensure that there was sufficient integrity in the steel cage unit for safe lifting from the truck to placement in the works.

All work carried out prior to delivery is checked and approved working collaboratively alongside contractor. The software that produces the 3D BIM object can then be transferred and handed to the design team, main contractor and client as discipline specific data into the single shared model avoiding the loss of information further providing more extensive information of complex structures with compliance to BIM level 2. The modular steel reinforcement solution was then assembled in a safe and quality controlled factory environment then delivered 'just in time' to the project for safe lifting from the truck to placement in the works.

All steel reinforcement supplied by Express complies with the latest British Standards and Industry Quality Accreditations and is fully traceable back to the mill. All raw material (scrap) purchased by the mill is sourced from within the UK and the steel reinforcement is produced from 98% recycled material. With greater emphasis being placed on the use of sustainable products sourced from local producers our steel reinforcement fully complies with industry requests. With the additional benefit of having BRE accreditation our product gains valuable BREEAM and CEEQUAL compliance and awards. Express are continually developing sustainable products and delivery solutions right across the supply chain.

For further information visit:
www.expressreinforcements.co.uk

BRC
TARGETING PERFECT SERVICE

The True Cost of REINFORCEMENT

In 1995, the Welsh Government set out plans to update one of the busiest routes in South Wales in the hope of encouraging social and economic regeneration of the Heads of the Valleys area.

This project was identified as critical to the area, in order to improve access to key services, jobs and markets supporting inward investment to areas such as the Ebbw Vale Enterprise Zone.

In December 2014, the project entered its construction phase with Costain fulfilling the main contractor role and BRC winning the contract to supply over 3000 tonnes of steel reinforcement bar and mesh to Section 2 of the project, due for completion in 2018.

From the beginning of the project, there has been a significant commitment to reduce the overall CO_2 footprint of the supply chain. The promotion and use of short, strong and local supply chains, as well as the specification of responsibly sourced steel, have been critical to the overall reduction in emissions. All of the reinforcing steel that BRC supply is manufactured in the UK using only domestically sourced recycled scrap metal via the Electric Arc Furnace method. The EAF process gives the reinforcing steel a recycled content of 98%. This ensures that the reinforcing steel supplied is 100% UK sourced and in this occasion will have travelled just 44 miles from production to the construction site, via BRC Newport where it has been fabricated.

In conjunction with this, BRC has been working with Costain to help identify the 'True Cost of Reinforcement'. This project specifically looks at lowering a number of waste activities along the supply chain from fabricator to supplier. The study has looked at a variety of areas such as the impact of indirect work, internal logistics, planning, re-work, un-used time and interruptions, all of which if not properly managed can increase lead time, cost and CO_2 footprint on a project.

Using the methodology of onsite observations, time and motion studies and liaising with personnel, it was identified that one area in which improvements could be made was to Costain's carbon consumption. By increasing the average load of reinforcing steel and mesh deliveries to site from 19 tonnes to 25 tonnes, the project has saved nearly 3 tonnes of CO_2. Other notable improvements from the study have come in the form of increased bar mark identification and improvements to the delivery process in the form of site wide maps and clear call-off and delivery instructions for key personnel.

This project is just one example of how BRC are working in line with industry partners to reduce the environmental impacts, removing waste and reducing programme pressure of major construction projects as well as promoting the use of sustainable local suppliers throughout the entire supply chain.

For further information visit: **www.brc.ltd.uk**

OUTOKUMPU STAINLESS STEEL REBAR **REINFORCES** SEA DEFENCES

Outokumpu has delivered Forta DX 2304 duplex stainless steel rebar for the Cromer coast in the UK. Cromer, located on the stormy North Sea coast, needed to rebuild its sea defences and prepare for rising sea levels.

Cromer is a well-known resort with a historic sea front and beloved beach, with original sea defences of a series of walls and timber groynes, some dating back to 1845. With rising sea levels and storms threatening the area, the town launched a coast protection scheme in 2013 in order to refurbish the sea defences and make them ready for the anticipated sea level rise to come over the next 100 years.

The project included refacing the concrete sea walls, improving parapet walls and repairing timber groynes. In coastal protection, timber groynes play a vital role as they keep as much sand as possible on the beach, to absorb the force of the waves before they hit the sea wall and cliff.

Says Stephen Jones, Rebar Commercial Manager at Outokumpu: "Stainless steel rebar was chosen to support the concrete because of its superior corrosion resistance. With a critical chloride threshold level ten times greater than carbon steel rebar, stainless steel required less concrete cover while retaining its integrity and strength in spite of chloride ingress from the saltwater. It is virtually maintenance-free, has a low life cycle cost and will maintain its corrosion resistance over the designed life of the sea defences."

Says North Norfolk District Council Coast Protection Engineer Brian Farrow: "In the new protection scheme, our brief to consultants required that walls and groynes needed to be designed to maintain not only the existing level of defence but they would also need to hold up against rising sea levels. At the same time, keeping the visual character of the seafront and preserving both stable beach and beach access were important for us. Now completed, the coast protection scheme ensures that the Cromer Coast beach and sea front is there for the next generation to enjoy."

For further information visit: **www.outokumpu.com**

HEAVYWEIGHT FUTURE PROOFING AGAINST CLIMATE CHANGE

The UK Met Office has confirmed that the last three years, 2014 – 2016, have been the hottest consecutive years on record with 2016 being the warmest ever recorded with an average temperature 1.14C above pre-industrial levels. It is believed that climate change and the peaking of the El Nino weather phenomenon are to blame.

Despite rising greenhouse gas emissions trapping ever more heat on Earth, the last decade has seen relatively slow warming of air temperatures, dubbed a "pause" in climate change by some. However, global warming had not paused at all. Instead, natural climate cycles led to more of the trapped heat being stored in the oceans. Now, according to the Met Office, all the signs are that the period of slower rises in air temperatures is over and the rate of global warming will accelerate fast in coming years.

For the UK, climate change could mean not only hotter summers but also increased risk of severe flooding. The Climate Change Committee's 'UK climate change risk assessment evidence report' highlighted the significant health risks of hotter summers that could result with up to 7,000 additional premature deaths per year by 2050. The committee reported that London summer temperatures could hit 48C. Meanwhile, the risk of extensive flooding is expected to increase significantly across the UK due to heavy and prolonged rain patterns.

Heavyweight concrete construction can do much to mitigate the impacts of climate change as it can help future proof buildings. Hotter summers could mean uncomfortable living conditions in many lightweight homes, such as timber or steel structures, which do not offer the innate thermal mass of heavyweight construction. Buildings using lightweight construction are more likely to overheat and feel the full effects of summer heat. The combination of good ventilation and the inherent thermal mass of heavyweight construction absorbs heat gains and helps to stabilise internal temperature.

The increased energy consumption from installing air conditioning would significantly increase the CO_2 emissions of lightweight buildings and, therefore, their environmental impact. Thermal mass helps to future proof buildings against a warming climate and can save energy by minimising or even negating the need for air conditioning during the summer and, in well insulated buildings, by reducing heating requirements during the winter.

In addition, the robustness and inherent flood resilience of heavyweight construction means that it is better able to cope with storms and flooding as it remains dimensionally stable as it does not warp when wet.

Extreme weather events such as flooding, storms and heat waves resulting from climate change pose significant threats to buildings and their occupants. The majority of today's buildings have been designed and constructed for the prevailing climate in which they were built and so may be unable to cope with future climate change. Architects and designers should take full notice of how the inherent thermal mass and flood resilience benefits of heavyweight construction can help to future proof buildings again the impacts of climate change.

RAISING THE BAR

BRITISH ASSOCIATION OF REINFORCEMENT

www.uk-bar.org

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.

BAR Members' Directory

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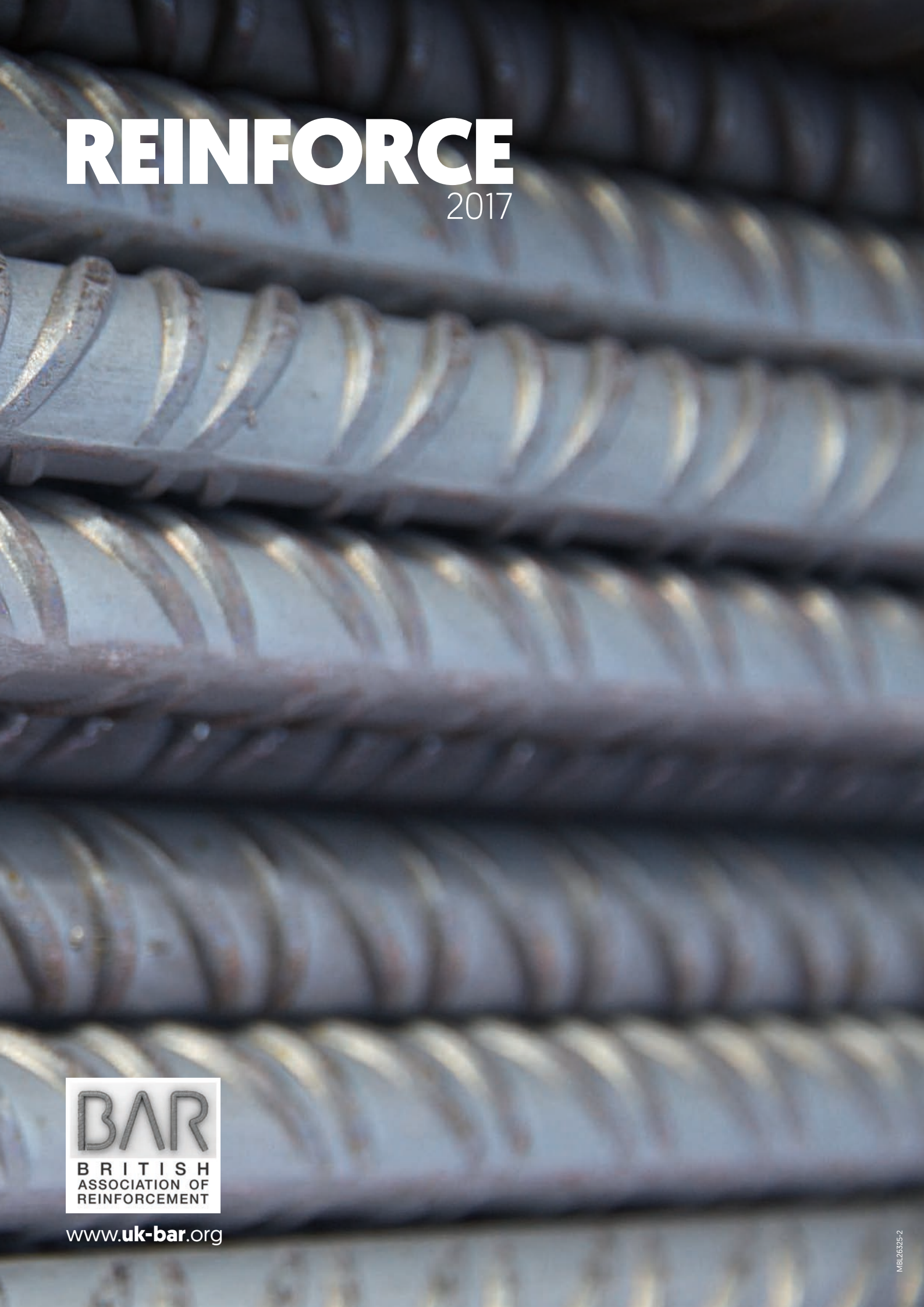

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