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DOME LIFT AT HINKLEY POINT C

The Polar Crane being lifted into place

At the end of last year Saren's 5,000 tonne SGC-250 - affectionately named Big Carl after the company's technical director Carl Sarens - successfully lifted the 245 tonne, 47 metre diameter, 14 metre high dome onto Hinkley Point C's first reactor building.

The major milestone closes the roof on the site's first, 44 metre high reactor building, allowing the nuclear reactor to be installed later this year. The power station's two nuclear reactors will provide consistent low-carbon electricity for six million homes, for around 60 years, while boosting Britain's energy security.

Starting at 07:20 in the morning the lift was planned to take advantage of a 'weather window' that ensured the 90 minute lift could be completed in low wind conditions.

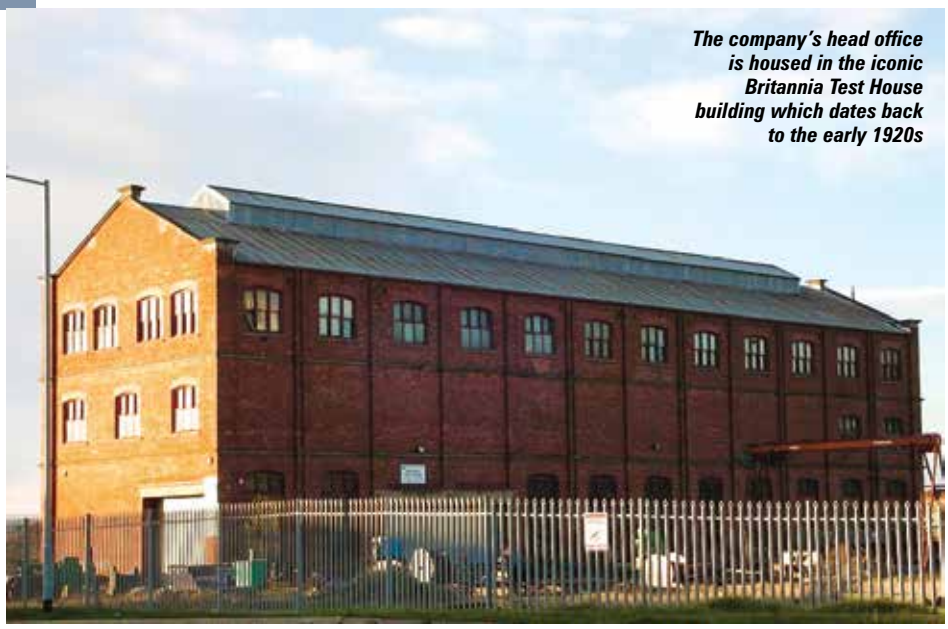
The dome is the top part of the building's inner containment - a steel cylinder encased in concrete. At 47 metres diameter, it is wider than the dome of St Peters Basilica in Rome - only 42 metres - and the one on the Panthéon in Paris - 44 metres. It is made up of 38 prefabricated panels which were shipped to Hinkley Point C and welded together onsite. Prefabrication and modular construction are key features of Hinkley Point C's construction.

Earlier in December, the 'Polar Crane' was lifted into place on top of the building's third and final steel liner ring. This internal overhead crane will rotate 360 degrees above the reactor and be used for refuelling and installing equipment. This was the last item that needed to be lifted into position before installing the dome.

Lowering the 245t dome

Nuclear Island area director Simon Parsons said: "Building the UK's first nuclear power station in a generation is a challenging job. Installing the dome allows us to get on with the fitting of equipment, pipes and cables, including the first reactor which is on site and ready to be installed."

Big Carl was shipped to the Hinkley C site almost four years ago on more than 400 trucks. It was then rigged with 118 metres of main boom and a 52.3 metre luffing jib. In this configuration the crane can handle 4,250 tonnes at a radius of 40 metres and take a staggering 883 tonnes out to its maximum 170 metre radius. In terms of counterweight, the crane uses its 52 specially reinforced shipping containers which are filled with 'locally sourced ballast material' such as sand, to provide 100 tonnes of counterweight each - up to 5,200 tonnes in total. ■



The company's head office is housed in the iconic Britannia Test House building which dates back to the early 1920s

TESTING, TESTING....

UK based Durham Lifting offers a comprehensive range of lifting services including inhouse design and fabrication of modular beams and heavy lifting equipment, a number of testing facilities including a 3,000 tonne test bed and a sales and rental department. Editor Mark Darwin spoke with managing director Amanda Gardiner about its history, recent developments and plans for the future.

Amanda Gardiner

Durham Lifting was established in 1996 by Frank Pickersgill, a pioneer of the modular spreader beam concept. The company has revenues of £6 million, of which sales and rental account for about 30 percent with the rest split equally between fabrication, testing and service.

"Durham Lifting excels in providing comprehensive heavy lifting solutions, guiding our clients from concept to completion," said Gardiner. "With years of expertise dealing with large capacities, we offer various testing facilities capable of handling up to 3,000 tonnes. Our integrated design and fabrication facilities ensure we are the ideal partner for our client's needs."

The family-run business has recently undergone a change of ownership. The reins and 100 percent ownership now belong to Frank's daughter, Amanda - who has been managing director of the company for more than 25 years - and son-in-law Paul, a qualified design engineer and highly experienced proof load tester who has been instrumental in the development of the company's new product range. The third generation - in the form of his grandchildren Samuel and Olivia - are also involved in the business.

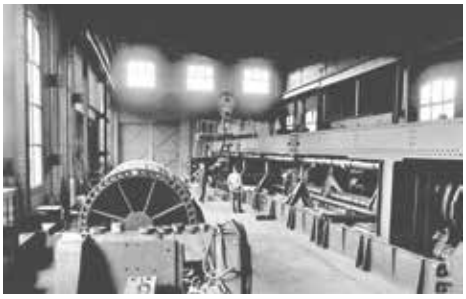
Durham Lifting is based in Middlesbrough in the North East of England, with a branch in Newton Aycliffe. Expansion of the company has seen the launch of the branded product Multisec, easily recognisable by its distinctive pink modular spreader beams and frame systems. Two years ago, Multisec began expansion overseas with distributors in Europe and East Asia and these will be added to in the future.

SO HOW DID YOU GET INTO THE INDUSTRY?

"My father was a crane engineer at British steel and Kone Cranes, then partnered up with a company called Ken Elder Engineering," said Gardiner. "At 13 I needed something to do during the summer holidays and ended up answering the phone and running errands etc... When he became a director of Ken Elder Lifting, I became more involved and began working full time. I was running the hire department at 19 - dealing with some very big equipment even then - and became a managing director in 1996 at the age of 23. Growing the business has been challenging and has included lots of learning and great fun. I love being surrounded by a great team who share the passion for everything we do."

HISTORIC BUILDING

The company's head office is housed in the iconic Britannia Test House building which was purchased in 1991. It dates back to the early 1920's, when it served Teesside's rapidly growing industrial base which included shipbuilding and railways to satisfy demand for accurate testing and certification of materials.



The massive Avery test machine in the Test House that is still going strong today was commissioned to test girder beams up to 1,250 tonnes Sydney Harbour Bridge

The Test House initially focussed on assessing the mechanical properties - tensile strength, hardness, and resilience - of materials such as iron and steel. However, it soon evolved into a hub of innovation, collaborating with engineers, metallurgists and scientists to refine testing methodologies. This led to the establishment

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The Avery test machine today

of industry benchmarks for material quality and performance as well as influencing local, national and international standards resulting in Britannia Test House's reputation as a pioneer in precision testing.

The current three storey brick building is the sole surviving remnant of the Britannia Steelworks, once owned by the revered company Dorman Long which in 1967 merged with South Durham Steel Iron Co, Stewarts and Lloyds to create British Steel and Tube just before the steel industry was nationalised becoming the British Steel Corporation.

Dorman Long constructed many of the most iconic bridges of the twentieth century including Sydney Harbour Bridge, the New Tyne Bridge, and the Tees Newport Bridge in Middlesbrough as well as the Forth Road Bridge in 1964, the Severn Bridge in 1966 and the Humber Bridge in 1981.

The massive Avery test machine in the Test House that is still going strong today at Durham Lifting was commissioned to test girder beams up to 1,250 tonnes for the 134 metre high Sydney Harbour Bridge construction of which opened in 1932.

TESTING

"The need for testing has never been higher, proving equipment before it is put into use is a vital requirement to prevent future failures or accidents," said Gardiner. "Testing proves the concept and Durham Lifting always ensures it knows how the equipment is used to ensure testing simulates working conditions. We take great care and pride in our work to ensure accuracy. A 'factor of safety' is applied to all products manufactured inhouse, and testing the equipment as used provides a safe approach to prove calculations."

Having the engineering skills inhouse means Durham Lifting can adapt to any test situation

"Having the engineering skills inhouse means we can adapt to any situation," she said. "No day is ever the same - we may carry out a jack/hydraulic test off pulling heads on the shop floor, a mobile crane in the yard, on the 1,250 tonne Avery bed, or off an A frame. If we are site testing, we might do a bollard test, winch test, or use waterbags - there are so many variations to what we do, and our engineering support strengthens our offering. We have an adaptable approach to all that we do, to test the new 1,600 tonne Multisec Monopile beam we had to extend the 3,000 tonne test bed to test 32 metres."

MULTISEC

Multisec produces a wide range of products including modular spreader beams, lifting frames and associated components. The standard beam range - available 'off the shelf' - ranges from the 13 tonne Multi13 to the 250 tonne Multi250. Each beam is made up of two end units and two drop links with interchangeable struts bolted in between to shorten or lengthen the beam. The Multi 250, for example, has a maximum load of 250 tonnes for a span of 16 metres reducing to 135 tonnes on a 22 metre span. All equipment is manufactured inhouse by its EN1090 accredited fabrication facility.

Multisec also designs and manufactures bespoke equipment. A recent example of this is the delivery of the 1,600 tonne capacity Monopile beam for an offshore wind project in Taiwan, its largest in terms of length and capacity. It was

Sydney Harbour Bridge

The Multisec 1,600 tonne capacity Monopile beam for an offshore wind project in Taiwan

designed and produced in less than two months. Weighing almost 30 tonnes, the beam has 32 metre lifting centres and comprises two metre end units with drop links and a combination of three eight metre, and one four metre struts.

HIRE

Heavy investment into Multisec spreader beams has enabled Durham Lifting to offer a large hire fleet from 10 to 800 tonnes available off the shelf, as well as Dyneema type slings, shackles and wire ropes to support the local growth in offshore wind, infrastructure, hydrogen and mining.

EXPANDING COVERAGE

Over the past five years the company has adopted a strategic approach to grow the areas of the business where its strengths lie. This includes creating the Multisec brand and appointing more distributors to reach international markets.

"Last October we announced a new strategic partnership for the Multisec spreader beam products with Mercia - a partnership which will see the two businesses collaborate on crane and supply projects, working closely together to develop product ranges and create a solid base for research and development," said Gardiner.

Durham Lifting has invested heavily into its testing capabilities meaning its facility can accommodate testing up to 3000 tonnes making it one of the largest test houses in Europe. This investment has seen not only the testing capacity grow but also the company's fabrication offerings allowing Durham Lifting and Multisec to fabricate higher capacity beams.

The Multisec spreader beam system

"We have recently completed our journey for F4OR fit with ORE catapult and have recently been awarded this accreditation," she said, "which is a great achievement for the team."

THE FUTURE?

"We are a family run business that has developed and grown in many sectors. We have developed a brand and are proud of the quality service we provide to our clients, old and new. The aim is to grow what we have, continue to train and develop our team and grow overseas trade."

"Currently, we are engaged in works for the Dogger Bank wind farm project, focusing on innovative winching solutions for blade lifters. Additionally, we have embarked on exciting new projects from Norway including tests on equipment capable of handling up to 2,000 tonnes, designing lifting frames for subsea applications, creating Multisec beams and refurbishing cranes that have been dormant for 30 years. We are witnessing growth across all departments, with our team demonstrating exceptional engineering skills and work ethic. I am immensely proud of their achievements and the progress we are making." ■

LOCK GATE REFURBISHMENT

An extremely limited working area, with minimal space between the cranes and lock basin, made the installation of a 94 tonne barrier gate at the Gambsheim Rhine lock near Strasbourg, France, a serious challenge for German crane rental company MSG Krandienst of Kehl.

Built in 1974 the Gambsheim lock is the largest on France's inland waterways. Its two huge chambers are 270 metres long by 24 metres wide, holding around 70,000 cubic metres of water. Around 100 boats, including large barges and long pushed convoys, use the lock on the Upper Rhine every day to rise the 10 or so metres of elevation on the Rhine Canal.

After 50 years of use, the two 24 metre wide, eight metres high lock gates weighing about 85 tonnes need to be removed, refurbished and reinstalled one at a time. 10 months after it was removed, the first refurbished gate was ready to be reinstalled. MSG used two eight axle Liebherr cranes working in tandem, a 650 tonne LTM 1650-8.1 and 450 tonne LTM 1450-8.1.

The limited space meant that the two cranes had to be set up so close together that it was not possible to slew the lock gate between them due to the minimum radius of the LTM 1650-8.1. The gate was therefore first lifted by two smaller cranes, with the two large cranes then taking over. The LTM 1650-8.1 was rigged with 42 metres of luffing jib, initially working over the top of the 450 tonner slewing the load in a wide arc around the LTM 1450-8.1 and to a point above the installation position. When the gate was lowered and fixed into the chamber there was just 200mm clearance between the gate and the roof of the control tower.

The project will continue until 2026, with the second gate due to be removed once the basin has been fully overhauled and tested.

BIGGER IS BETTER ON POWERHOUSE PARRAMATTA

The new 30,000 square metre Powerhouse Parramatta museum in Sydney is one of the largest and most significant structural engineering and architecturally complex projects under construction in Australia. The steel trusses are now being lifted into position with heavy lift tower cranes.

The arts & science building is the largest single investment in cultural infrastructure since the Sydney Opera House, and the first major cultural institution in western Sydney and is due to be completed by the end of the year. The largest museum in New South Wales it will feature more than 18,000 square metres of exhibition and public space, including Australia's largest column free exhibition space. Designed so that its exterior superstructure is an architectural feature, the museum's two buildings feature three types of steel lattice structures creating an exoskeleton.

Lendlease Construction is leading the work with Marr Contracting providing the heavy lift luffing tower cranes. The heavy trusses provide the structural support required to achieve the column free exhibition space below. However installing the trusses - each weighing up to 120 tonnes - created some serious challenges. Marr Contracting proposed a solution that used three of its Heavy Lift Luffing (HLL) tower cranes including a 330 tonne Favelle Favco M2480D - claimed to be the world's largest tower crane - along with a 150 tonne M1280D and 96 tonne M860D.

By designing larger heavier elements for the exoskeleton, including the steel trusses which were delivered outside of normal hours, the number of lifts was substantially reduced along with disruption and congestion in and around the site. More than 70 percent of the exoskeleton has now been installed.

Marr's design & engineering manager Andrew Coffin said: "In working closely with Lendlease we managed to streamline the construction methodology and adopt a crane solution that reduced complexity and significantly improved efficiency. The key was understanding the desired approach to building the project and designing the crane solution around that idea."

Managing director Simon Marr added: "This is an incredibly exciting project to be part of. Its construction will be testimony to the impact that technology, innovation, design and engineering have on our world. It took vision, innovation and collaboration to design a crane solution for this amazing project. Lendlease also had the vision to see the benefits of our proposal. It's a great example of achieving a better solution by asking 'how do you want to build the project?' and designing the lifting solution around this, rather than being driven by the limitations of the crane."

The museum will be Parramatta's first 6 Star Green Star Building, and one of the first projects in Australia to use 100 percent renewable diesel (HVO100) in the equipment on site, including the cranes. ■

The project is using Favelle Favco Heavy Lift Luffing tower cranes

How the museum will look when finished

INNOVATIVE SOLUTION FOR SYMBOLIC RAILWAY BRIDGE

When it came to installing a new Oder railway bridge between Germany and Poland, Dutch international crane and heavy lift company Mammoet encountered some unusual challenges, forcing it to find an innovative solution which also reduced construction time and minimised disruption to the rail network.

The new rail crossing is part of the pan-European rail network and a central element of the Berlin-Kostrzyn-Gorzów railway modernisation programme. The crossing revives the once famous Berlin-Königsberg-Eydtkuhnen rail line, breathing new life to an important pre-Cold War trade corridor. The 266 metre long crossing replaces a derelict, pre-War single track bridge with a distinctive 130 metre network arch spanning the river Oder - Poland's second longest river. The steel structure, with its crown positioned above the demarcation line of the border, is a landmark that highlights the importance of the location between the two countries.

Most river bridge replacements are floated into place using a combination of Self Propelled Modular Transporters (SPMTs), launching plates and a pontoon. However, the shallow and changing water levels of the river made the pontoon method impractical, if not impossible. The size of the bridge was also a factor being 180 metres long and weighing 2,100 tonnes, ruling out a big crane solution. After due consideration Mammoet managed to avoid cranes and pontoons with a solution that was more flexible, safer and more efficient.

CONSTRUCTION TECHNIQUE

The new bridge is a network arch bridge with carbon hangers and will help to increase line capacity and shorten travel times by allowing a maximum permissible train speed of 120kph.

The bridge was assembled on the German side of the Oder and moved as a whole structure across the river to its final installation position. First the bridge was jacked up to two metres, allowing the SPMTs to be positioned underneath, it was then transported to the riverbank and positioned over the first of five temporary supports. The bridge was then launched using a combination of custom designed launching plates and strand jacks that pulled the structure horizontally until it reached the next temporary support. This process continued until the bridge reached the opposite side of the river.

The SPMTs supporting the rear of the bridge were then removed and skid shoes were installed to slide the bridge into its final position. At this point, the bridge was taken over by climbing jacks, which allowed the temporary supports to be removed and the bridge to be lowered down onto its final resting pillars.

The whole process required around 45 truckloads of specialist heavy equipment including 96 axle lines of SPMTs, 26 launching plates, 10 climbing jacks and two strand jacks.

PLATE SPINNING

One of the key considerations with any bridge launch is the risk of structure deformation during the launch process. To solve this, temporary supports with hydraulic cylinders were used at the quay edges and in the water, as well as modified launching plates. The plates were equipped with spherical bearings allowing them to be moved in any direction. During the launch the weight on each tower and cylinder was controlled to ensure a smooth and safe operation.

Jack van der Vloet, Mammoet's lead engineer said: "It is a big bridge and wind loads had to be considered. It has a large deflection, so the launching plates had to be modified. Typically, they swivel in two directions, however, in this case they had to swivel 360 degrees. This always gave us full control of the operation. This method of bridge installation using modified launching plates can be adapted for other bridge projects, where using a crane or pontoon is not possible or is inefficient." ■

NEW CORDLESS HYDRAULIC PUMP

Dutch heavy lift jacking and lifting gear manufacturer Enerpac has introduced a new SC-Series compact cordless battery powered hydraulic pump. Aimed at larger jobs in difficult to access and remote sites if can be used with the 'Enerpac Connect' app, to access job specific data and information.

Weighing just 9.2kg including oil and battery, the pump eliminates extension cables, noise and generators. With an operating pressure of up to 700 bar/10,000psi, the pump's 54volt, 4Ah lithium-ion battery powers a highly efficient AC brushless motor which provides sufficient runtime for a typical high cycle speed, high-pressure applications before needing to be recharged. The unit comes with two batteries allowing one to be recharged while the other is in use, much like a cordless drill.

Enerpac SC Pump

Enerpac SC-Series operating a lifting wedge

LIGHTER TRUNNION SPREADER BEAM

UK based modular spreader beam manufacturer Modulift has redesigned its line of Trunnion spreader beams, making them both lighter and less expensive.

The new Trunnion beam does not require shackles or drop links and is available in various sizes. Compatible with the existing range, the Trunnion End Unit is interchangeable with struts from the existing MOD 110 up to the MOD 600/1000 product lines.

Trunnion EU with tugger points

Trunnion SB