

HINKLEY POINT C
TUNNELLING & MARINE PROJECT

A HEAVY LIFTING SOLUTION FOR THE UK'S BIGGEST CONSTRUCTION PROJECT

AT A GLANCE

CLIENT	BALFOUR BEATTY CIVIL ENGINEERING
PROJECT	HINKLEY POINT C TUNNELLING & MARINE PROJECT
LOCATION	BRIDGEWATER, SOMERSET, UNITED KINGDOM
SECTOR	NUCLEAR
DATE	JAN 2019 - APR 2021

WHAT IT TOOK

CRANES	1 X M2480D
ENGINEERS	2
INSTALLATION CREW	6
MAINTENANCE CREW	1

INTRODUCTION

Hinkley Point C nuclear power station (HPC) is one of Europe's largest and most complex construction projects and the first new nuclear power station to be built in the United Kingdom (UK) in over 20 years.

Part of the UK's strategy to achieve net zero by 2050, Hinkley Point C will make a major contribution to the UK's move to reduce carbon emissions by providing low-carbon electricity for around six million homes.

The electricity generated by its two EPR reactors will offset nine million tonnes of carbon dioxide emissions a year, or 600 million tonnes over its 60-year lifespan. During construction and operation, it will also create thousands of jobs, bringing lasting benefits to the UK economy.

In 2017, the EDF Energy subsidiary responsible for building and operating the new power station, Nuclear New Build Generation Company (NNB GenCo), awarded Balfour Beatty with the contract to deliver the tunnelling and marine works

as one of three major packages of works Balfour Beatty are delivering on Hinkley Point C.

Around the same time, Balfour Beatty invited Marr to present the advantages of our heavy lift craneage solutions to members of their senior engineering and construction team and asked us to look at the lifting requirements they had planned for Hinkley Point C.



THE CHALLENGE

In what is one of the most complex marine engineering projects ever undertaken in the UK, Balfour Beatty's scope of works was for the construction of the outtake and intake tunnels for the cooling water needed for the Nuclear Reactor Units 1 and 2. It involved installing the tunnel boring machines (TBMs) and associated tunnel segments and conveyer systems used for the removal of spoil during tunnel excavation works.

Balfour Beatty sought an alternative to the traditional approach of using large crawler cranes and a yet-to-be designed gantry system. This would have required a lot of temporary works and double handling of equipment for the tunnel construction and ring segments for the tunnel lining. Given the constrained site and topography, the original concept raised concerns around productivity.

The installation of the TBM also presented Balfour Beatty with the challenge of how to lift and rotate a number of heavy components from transport to installation on the project, without using two separate cranes to rotate the loads – with the added complexity of working in a coastal location where high winds were a constant challenge. Compounding this complexity, a number of tower cranes were already working on the project for other contractors, creating the potential for boom-clash between tower cranes.

OUR SOLUTION

Balfour Beatty's open approach to early engagement with their supply chain, was ideally suited to Marr's way of thinking about crane solutions on large infrastructure projects. We were able to look at the project with a fresh set of eyes and identified the opportunity to place one of our M2480D Heavy Lift Luffing (HLL) tower cranes in a location where it could offer a single solution for all the lifting requirements.

Placing our M2480D on 72 metres of free-standing tower with a 102-metre radius boom and fly combination allowed Balfour Beatty to operate independently above the other cranes on site, reducing the potential for boom clash on the project.

With a capacity of 25 tonnes at 100-metre radius and a maximum lift capacity of 220 tonnes in this configuration, the solution provided the lifting capability required to pick materials and components from the tunnel segment storage area and lower them to the pit bottom in one lift. This removed the need for multiple gantry cranes and double handling and enabled the construction of the conveyer system.

The M2480D's lift capacity and dual hook configuration also gave Balfour Beatty the ability to install the TBM with one crane and unlike a heavy lift crawler option, the M2480D required no Super Lift attachment to complete any of its lifts.

With the freestanding crane occupying significantly less area than a crawler, our solution helped to alleviate logistical complexity on the busy construction site.

Laydown areas were created because of the minimum radius capability of the M2480D – at 9 meters compared to circa 36 meters for a large

crawler, with a footprint of approximately 16 square metres at its base. This also significantly improved laydown which would have been taken up to accommodate the travel and slew of a large crawler.

THE RESULT

Balfour Beatty's willingness to engage with us early in the planning stages for this project created the opportunity for us to design a craneage solution which:

- reduced the complexity of the Hinkley Point C works;
- lowered project risk by reducing the number of lifting and handling activities;
- reduced the number of cranes—meaning less hazard from live plant on site; and
- enhanced productivity through the ability to pick and place segment bundles in one activity

Collaborating on the basis of 'cranes as a forethought, not an afterthought' allowed us to position the right crane that met the overall needs of the project, as opposed to the traditional method of filling the site with multiple cranes.

The 100-metre-plus reach of the M2480D gave up to 570 per cent more coverage than would have been possible with an alternative craneage design.

The creation of extra laydown space for Balfour Beatty was substantial because of both the maximum and minimum radius of the crane's capability. An estimated 17 per cent increase in storage and laydown space was achieved.

In a coastal location with a constant risk of high winds where safe operation in wind speeds above

nine meters per second would have been largely unachievable for mobile and crawler cranes, the M2480D can safely operate in conditions of up to 20 metres per second.

With just one crane in operation and only one crew needed to operate it, a considerable reduction in labour was available compared to the labour requirements for gantries and multiple crawlers because every time a hook is in operation, operators are required.

"Early engagement between Balfour Beatty and Marr enabled a safe and suitable foundation to be designed for this geotechnically complex location. The two stand out benefits of the crane were flexibility and dual hook lift ability. The boom length and very high lift capacity enabled tunnel operations to be flexible to the changing site configuration, allowing us to pick and place all plant, equipment and materials over a very large area of the site. Secondly, the dual hook lift ability enabled the crane to single-handedly pick and rotate heavy TMB components with ease, without the need for a second crane. A very impressive and versatile crane – it was great to have the opportunity to work with it!" said Patrick Brady, Temporary Works Manager, HPC Tunnels & Marine Contract, Balfour Beatty Major Projects.

SOCIAL IMPACT

Consistent with the commitments Balfour Beatty and Hinkley Point C have made to local employment and the development of a sustainable regional supply chain, Marr has contributed to the positive socio-economic benefits of the project through the sourcing of local labour and supplies, as well as spending within the local economy.





01 / START >

Located in a coastal location where high winds are a constant challenge meant that operating in wind speeds above 9 metres per second would have been largely unachievable for mobile and crawler cranes.

The M2480D HLL can safely operate in conditions of up to 20 metres per second.



02 >

Placing the M2480D on 72 metres of freestanding tower with a 102-metre radius boom and fly combination allowed Balfour Beatty to operate independently above the other cranes on site, reducing the potential for boom clash on the project.

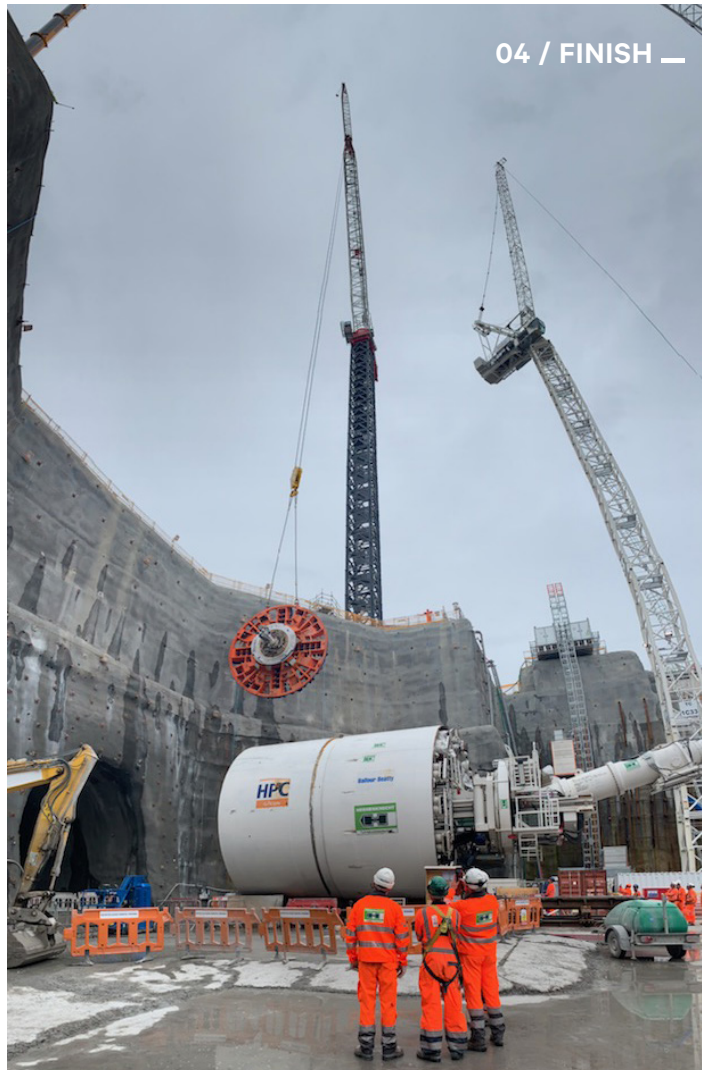
With the freestanding M2480D occupying significantly less area than a crawler crane, Marr's solution also helped to alleviate logistical complexity on the busy construction site.



03 >

With the M2480D in a location where it could offer a single solution for many of the heavy lifting requirements on the project, the 100-metre-plus reach of the M2480D gave up to 570 per cent more coverage than would have been possible with an alternative craneage design.

The crane's maximum and minimum radius capability also allowed for an estimated 17 per cent increase in storage and laydown space.



04 / FINISH —

The risk of high coastal winds added to the complexity of how to lift and rotate a number of heavy components – such as tunnel boring machines (TBMs) and associated tunnel segments and conveyer systems – from transport to installation.

The M2480D's lift capacity and dual hook configuration gave Balfour Beatty the ability to install the TBM using a single crane without the need for a Super Lift attachment that would have been required using a heavy lift crawler option.



The two stand out benefits of the crane were flexibility and dual hook lift ability. The boom length and very high lift capacity enabled tunnel operations to be flexible to the changing site configuration, allowing us to pick and place all plant, equipment and materials over a very large area of the site.



**PATRICK BRADY, TEMPORARY WORKS MANAGER,
HPC TUNNELS & MARINE CONTRACT,
BALFOUR BEATTY MAJOR PROJECTS**



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Image courtesy of International Cranes & Specialised Transport (KHL Group)