

FOCUS30

THE CRANE FOR CONFINED SPACES

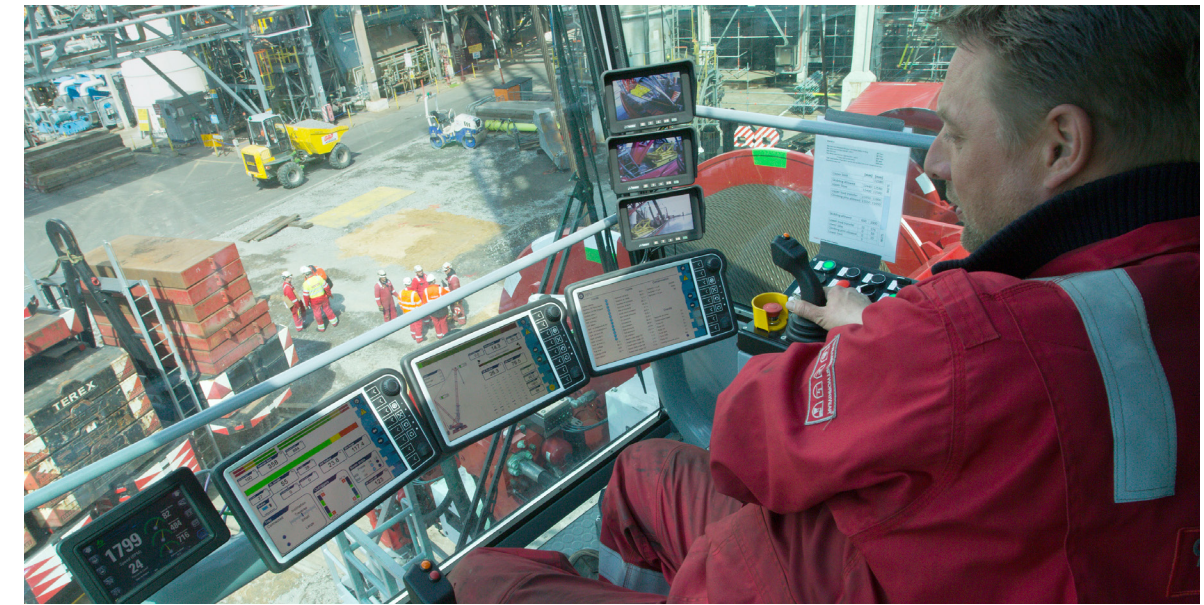


FOCUS30

AS POPULATIONS GROW, DEMAND FOR ENERGY AND INFRASTRUCTURE INCREASES. LARGE INDUSTRIAL FACILITIES BECOME MORE COMPLEX AND CROWDED. CITIES EXPAND AND BECOME CONGESTED. AT THE SAME TIME, DEVELOPMENT WORK MUST CONTINUE.

SO MAMMOET CREATED **FOCUS30** - THE CRANE FOR CONFINED SPACES.





THE WORLD IS EXPANDING AT A RAPID PACE. AS POPULATIONS RISE, THEY MUST BE SUPPLIED WITH THE POWER, INFRASTRUCTURE AND MOBILITY NEEDED FOR ECONOMIC GROWTH. THE IEA PREDICTS THAT DEMAND FOR ENERGY WILL RISE BY 1% PER YEAR UNTIL 2040, AND WHILE RENEWABLE ENERGY SOURCES WILL PLAY THEIR PART, THE ENERGY TRANSITION WILL NOT BE INSTANT.

In the meantime, refineries and other facilities will be called upon to increase production and deliver new, more efficient fuels - often from their existing footprints, as they lack room to further expand. While in the city, each increase in population density will make the next construction project more challenging than the last.

So, increasingly dense urban environments will come to be served by increasingly complex energy facilities. Finding space to build in these environments will be an increasingly significant challenge, requiring a crane that can be brought to site around existing plant and erected within the smallest possible footprint. This is the world of FOCUS30.

COMPLEX FACILITIES

Although reliance on fossil fuels is falling, a fully renewable energy balance is some decades away. This means that we still need existing facilities if we are to maintain the balance between growth and sustainability, while securing energy supplies. An important part of achieving this will be to make the most of existing assets in terms of lifespan, output volumes and efficiency.

Economic pressures will influence how energy companies manage assets. Macro trends such as energy security, sustainability targets, and economic policy encourage corporate strategies that focus on the refurbishment and expansion of existing sites rather than the development of new facilities. Broader changes in the volume

of imported fuels may also encourage increased refining activity closer to home. This will mean that oil and gas facilities that might otherwise have been reaching the end of their initial working life are reconditioned to continue operating.

A critical engineering challenge when aligning the output of existing facilities with strategy is space. At a new greenfield facility, the plant is built around the crane. The crane can always be moved into open spaces to make each lift. At an existing brownfield plant, things get much more complicated because the crane needs to be built around the plant. The spaces that were once accessible during the initial construction are no longer available.

Personnel and plant in the units adjacent to where the lifting activities are planned must be protected. Without a heavy lift solution that can be built within a small footprint, conventional cranes are built across units and above existing plant. In doing so, owners must face a cut in output whilst assets and resources are closed and moved to accommodate the build process.

The boom of the FOCUS30 can be erected entirely within its own 30mx30m footprint, so work can take place without triggering a time-consuming and costly shutdown.

CONGESTED CITIES

By 2050, the population of the world is expected to be ten billion, overlaid by the continued mega

trend towards increasing urbanization. This continued rapid growth means that more construction takes place in densely populated areas, and that infrastructure in many city centers will need to be replaced more regularly to accommodate the needs of larger populations.

SIMILAR CHALLENGES

Civil engineers must keep these expanding megacities running smoothly, but face a similar challenge. In dense urban areas where all available land is built upon, space for construction activities is at a premium. However, larger capacity cranes require significant room for setup - even though these might otherwise offer the best solution for large construction projects.

The space required to erect a traditional crawler crane means roads must be closed and other transport links interrupted, which has a big

impact on the smooth running of the city and the movement of goods and services. Understandably, local authorities place tight restrictions on this type of activity.

But the challenges large construction projects face don't end with space. The more complex the environment, the greater the administrative headache. Any one city block may have multiple land and building owners, a web of power and telecommunications cables running underfoot, while metro lines and sewerage systems add to the list of stakeholders. The most cost-effective approach may be to look beyond the scope of the lift itself, and instead focus on causing as little disruption to surrounding infrastructure.

The FOCUS 30 requires fewer closures to erect, and thanks to the low pressure it exerts on the ground - less than 10t/m² - it can lift without disturbing underground tunnels and cabling.



"Petrochemical complexes put much of the hard work in to meet the needs of a growing world that is consuming more energy, but they must operate within increasingly narrow limits.

Ever-larger plant and preassembled units are needed to meet demand and realize increasing economies of scale, yet with each installation site space becomes more and more limited. At the same time, many facilities are reaching the end of their intended lifecycles, yet new policy and legislation that focuses on climate change requires owners to produce cleaner fuel products without the luxury of expanding their facilities outward.

As a result, construction in confined spaces is a day-to-day reality that we face. Lifting operations must take place among a hive of site activity and must be managed carefully to guarantee safety. Live operations often need to be stopped and even a partial shutdown results in a costly loss of production.

The value of the FOCUS30 is that it reduces the impact of lifting on other site operations, because it can be erected vertically, entirely within its own footprint. This means more production can continue around maintenance and upgrade projects"

Gavin Kerr, Director Global Cranes



SMALL ASSEMBLY AREA, BIG LIFTS

THE FOCUS30 IS THE IDEAL LIFTING MACHINE FOR PROJECTS WITH COMPLEX INFRASTRUCTURE AND SPACE LIMITATIONS, SUCH AS REFINERY OVERHAULS OR DENSE INNER CITIES.





Mammoet recognized that a new solution was needed to better support customers for whom restricted space was limiting the scope of lifting operations. This solution would need to be assembled and operated in confined spaces but deliver the size of lifts that modular construction projects can demand. This led to the development of the FOCUS30, a vertically self-erecting crane which has been designed specifically to operate in areas with complex infrastructure and space limitations.

SMALL ASSEMBLY AREA

The FOCUS30 can be built vertically up to a hook height of 150m with an extremely small footprint of 30x30m that does not compromise its stability and strength. No other crane of its class can be assembled in such a small area, contributing significantly to safety and efficiency during the assembly phase. Among other advantages, this means that it is no longer necessary to shutdown areas of the plant adjacent to the crane build area. The

vertical assembly allows more work to continue uninterrupted around the crane.

Multiple innovations have made this possible:

- Its **main boom mast** is divided in sections and **erected vertically** using a guidance system that allows vertical mast **build-up**
- A **specific masthead** enables hoisting or lowering of the back mast during crane erection or disassembly
- A **feed system** on the crane's upper structure allows safe and convenient insertion of mast sections
- The **erection frame** allows stable vertical mast erection, based on a proven methodology for tower cranes.
- **Boom stop cylinders**, integrated in the support brace of the erection frame, keep the main boom mast sections vertical and stable

The result is a high-capacity crane that can be assembled in the smallest area possible, making it ideal for use in confined spaces. The only auxiliary lifting capacity needed is any locally





The FOCUS30 benefits industrial projects in three key ways:

- 1. IMPROVED PRODUCTIVITY.** The boom mast of the FOCUS30 is assembled vertically in sections, allowing its erection to take place from just a 30x30m footprint. This means that work can continue around the crane and more shutdowns can be avoided.
- 2. SHORTER PROJECTS.** The FOCUS30 can be assembled within 14 days and can be transported to the lift position in smaller, more maneuverable pieces that can be delivered around pre-existing infrastructure on site. It is also reconfigured in far less time than conventional cranes.
- 3. REDUCED RISK.** Boom erection does not overhang adjacent areas of the plant, so workers, pipe racks and other key infrastructure can operate more safely. Low ground bearing pressures minimize the risk of disturbing underground infrastructure, and avoids the need for costly foundations.

Specifications

- Load moment 30,000 tonne meters
- Class of crane 2,500t
- Outrigger setup 14x14m
- Footprint 30x30m
- Minimum GBP 6t/m²

available 400t hydraulic crane to lift its mast sections into place. An area of only 32mx42m is needed to build the crane on site.

LOW GROUND BEARING PRESSURE

The pedestal design of the FOCUS30 creates stability and helps to realize ground bearing pressures as low as 6t/m² - allowing it to be used on sites with softer ground, or where infrastructure below ground level must be protected. This helps to avoid additional ground-work and the risks that can come with it.

On sites that have seen decades of development, excavation could unearth unknown materials or infrastructure that results in further delays and expense to rectify before the project can continue.

LARGE AND VARIABLE OPERATIONAL WINDOW

The FOCUS30 can be operational within 10-14 days. This makes it well-suited for projects with a strict time window for execution, as it can be erected with little disruption to nearby work and be ready to lift quickly. The crane has a



variable superlift system and also a variable superlift tray. This allows the FOCUS30 to take on multiple lifts of different weights and at different radii without reconfiguration or changing the ballast. This means fewer interruptions to work on site, and greater efficiency.

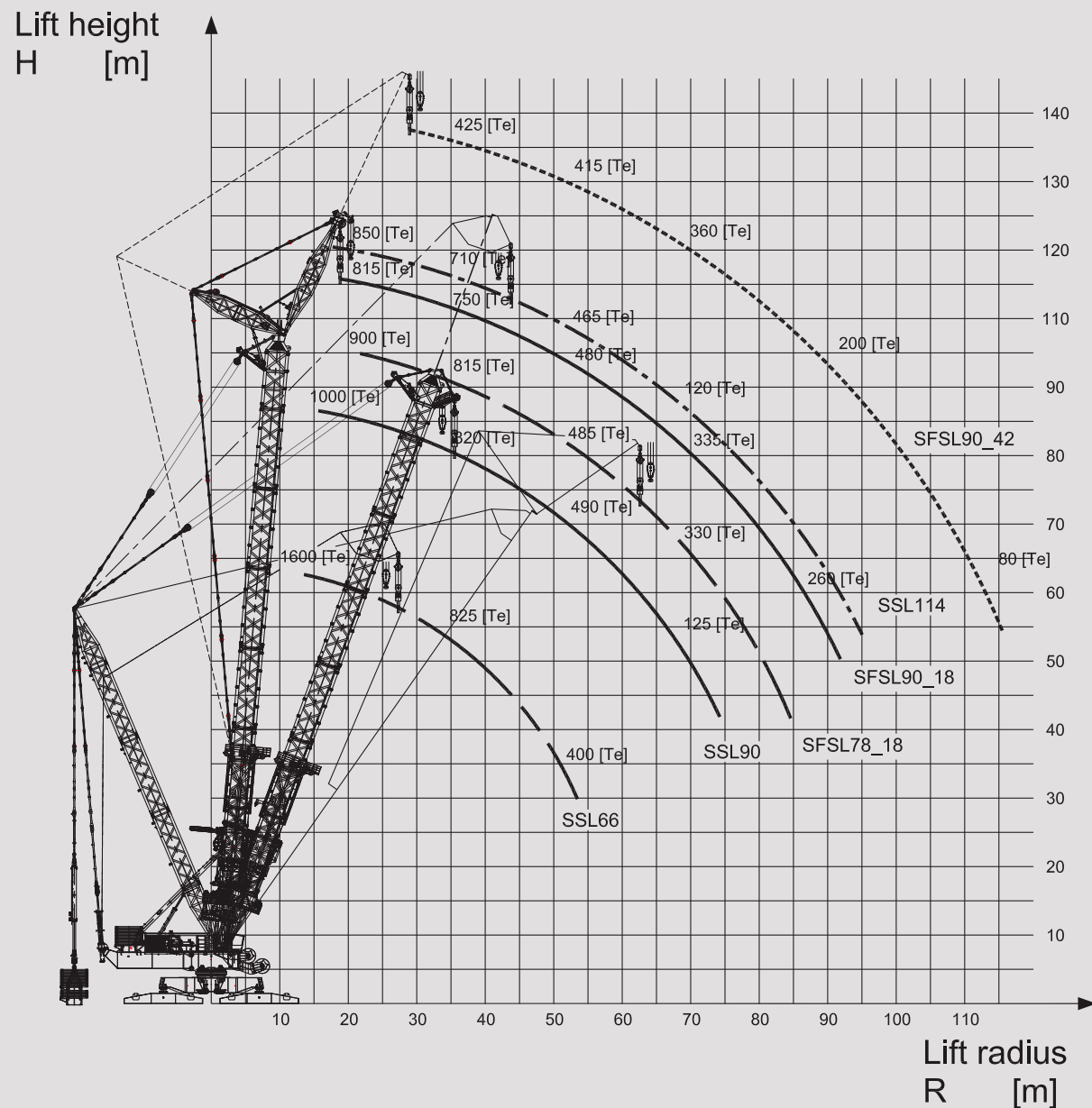
All of this increases the crane's flexibility on-site, allowing more lifts to be made using the same equipment, from the same location, and avoid the need for costly time consuming demobilization and assembly work.

SPECIFICATIONS

The FOCUS30 has the power to take on a wide range of lifts within complex industrial settings. It has a maximum load moment capacity of 30,000 tonne meters and offers 1000t lifting capacity at 20m radius. The crane can be assembled in 10-14 days, using 400t and 100t auxiliary cranes, and within a minimum footprint of 32x42m. Once assembled, it requires a single operator. It can hoist loads at 1.6 meters per minute when working at maximum capacity up to 4.0 meters

per second when unladen. It slews at a rate of one revolution per 20 minutes at maximum capacity, up to eight minutes per revolution when carrying no load.

The crane's outriggers measure 14mx14m, making an overall footprint of 30mx30m. The crane is continuously leveled under load by hydraulics in its outrigger supports. Its drive system uses diesel hydraulics, and its control system is electronic, through a central PLC.



	FOCUS30 SSL 66	FOCUS30 SSL 78	FOCUS30 SSL 90	FOCUS30 SSL 114	FOCUS30 SSL 126	FOCUS30 SFSL 78-18	FOCUS30 SFSL 90-18	FOCUS30 SFSL 90-42
Max lifting capacity	1980t	1634t	1200t	850t	691t	900t	813t	425t
Radius	10-60m	13-73m	10-80m	15-95m	15-112m	20-90m	20-100m	35-120m
Back mast length	54m	54m	54m	54m	54m	54m	54m	54m
Main boom length	66m	78m	90m	114m	126m	78m	90m	90m
Main boom angle	30-85°	30-85°	30-85°	30-85°	30-85°	30-85°	30-85°	30-85°
Jib length						18m	18m	42m
Max hoisting height								
Maximum radius	30m	35m	42m	54m	60m	42m	51m	54m
Minimum radius	63m	70m	87m	121m	118m	100m	116m	137m
Maximum average ground bearing pressure	10t/m ²	10t/m ²	10t/m ²	10t/m ²	10t/m ²	10t/m ²	10t/m ²	10t/m ²
Superlift radius	17-30m	17-30m	17-30m	17-30m	17-30m	17-30m	17-30m	17-30m
Superlift weight	0-1000t	0-1000t	0-1000t	0-1000t	0-1000t	0-1000t	0-1000t	0-1000t
Maximum operational wind speed	10m/s	10m/s	10m/s	10m/s	10m/s	10m/s	10m/s	10m/s
Auxiliary cranes required	1 x 400t 1 x 100t	1 x 400t 1 x 100t	1 x 400t 1 x 100t	1 x 400t 1 x 100t	1 x 400t 1 x 100t	1 x 400t 1 x 100t	1 x 400t 1 x 100t	1 x 400t 1 x 100t

BENEFITS

SIGNIFICANT LIFT FLEXIBILITY

The variable superlift system of the FOCUS30 allows the superlift radius to be adjusted between 16.5m and 30m under load, increasing the range of lifts the crane can perform without needing the time and space for reconfiguration. Its maximum superlift mass is 1,000t.

SERIOUS LIFTING CAPACITY

The FOCUS30 has a load moment capacity of 30,000 tonne meters and can lift up to 1,980t, and has the capacity to hoist almost any module installed at a refinery. It delivers over 1000t of lifting capacity at a 20m radius and over 800t at a 30m radius, giving it the flexibility to take on almost any job.

INNOVATIVE ASSEMBLY METHOD

The boom of the FOCUS30 is erected vertically in sections, and does not overhang its surroundings beyond its own footprint at any time during assembly. Therefore, the FOCUS30 makes heavy lifting possible again at sites where there is no space to lay down a crane boom.

LOW GROUND PRESSURE

In all configurations, the ground pressure of the FOCUS30 is limited to just 10t/m². This helps to avoid damaging infrastructure beneath the surface, which can lead to lengthy and expensive groundwork to repair tunnels or seal in contaminants.

SMALL ERECTION FOOTPRINT

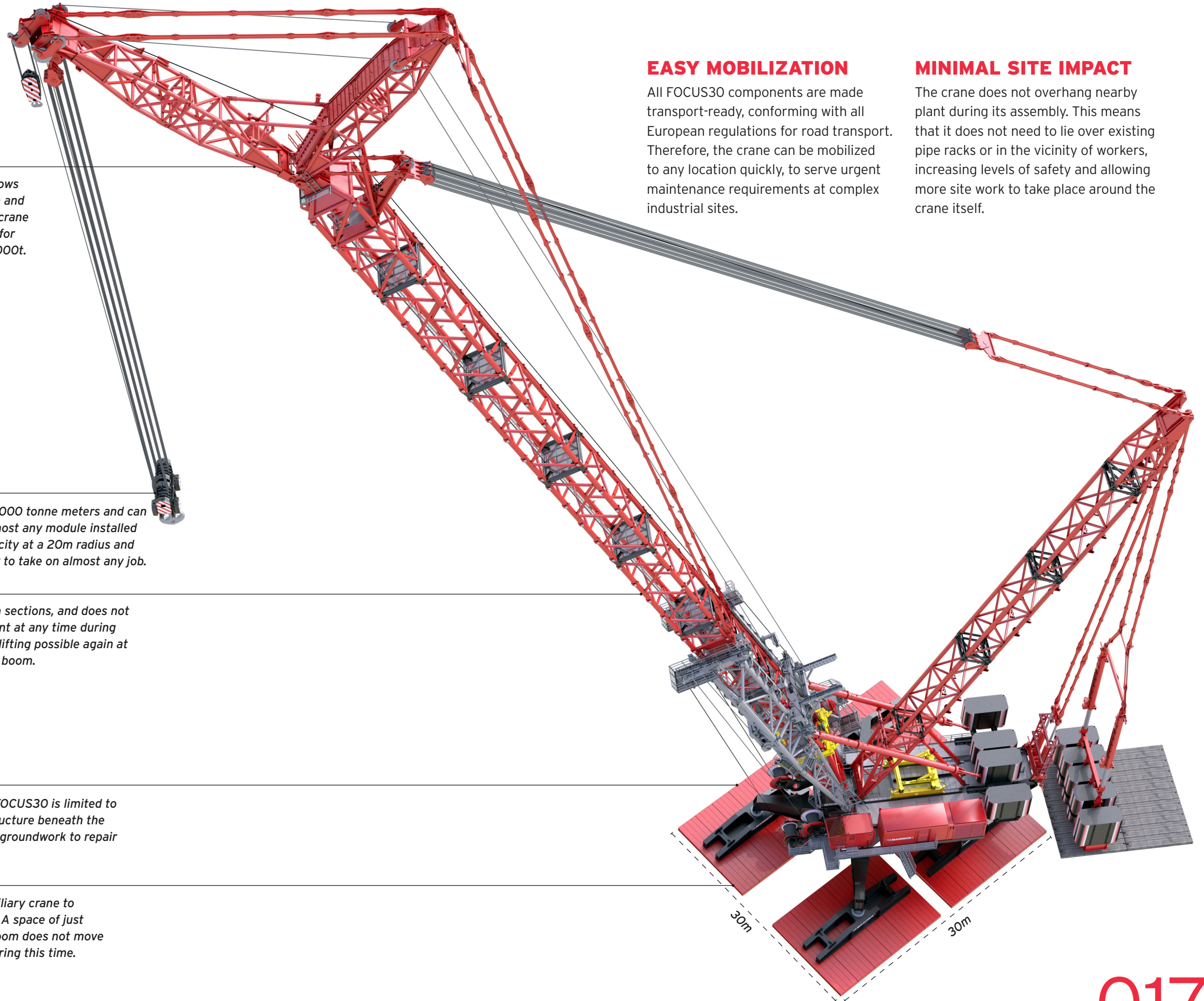
The FOCUS30 requires only a 400t and 100t auxiliary crane to assemble, and is ready to work within two weeks. A space of just 32m x 42m is needed to build the crane, and its boom does not move from the 30m x 30m footprint of the FOCUS30 during this time.

EASY MOBILIZATION

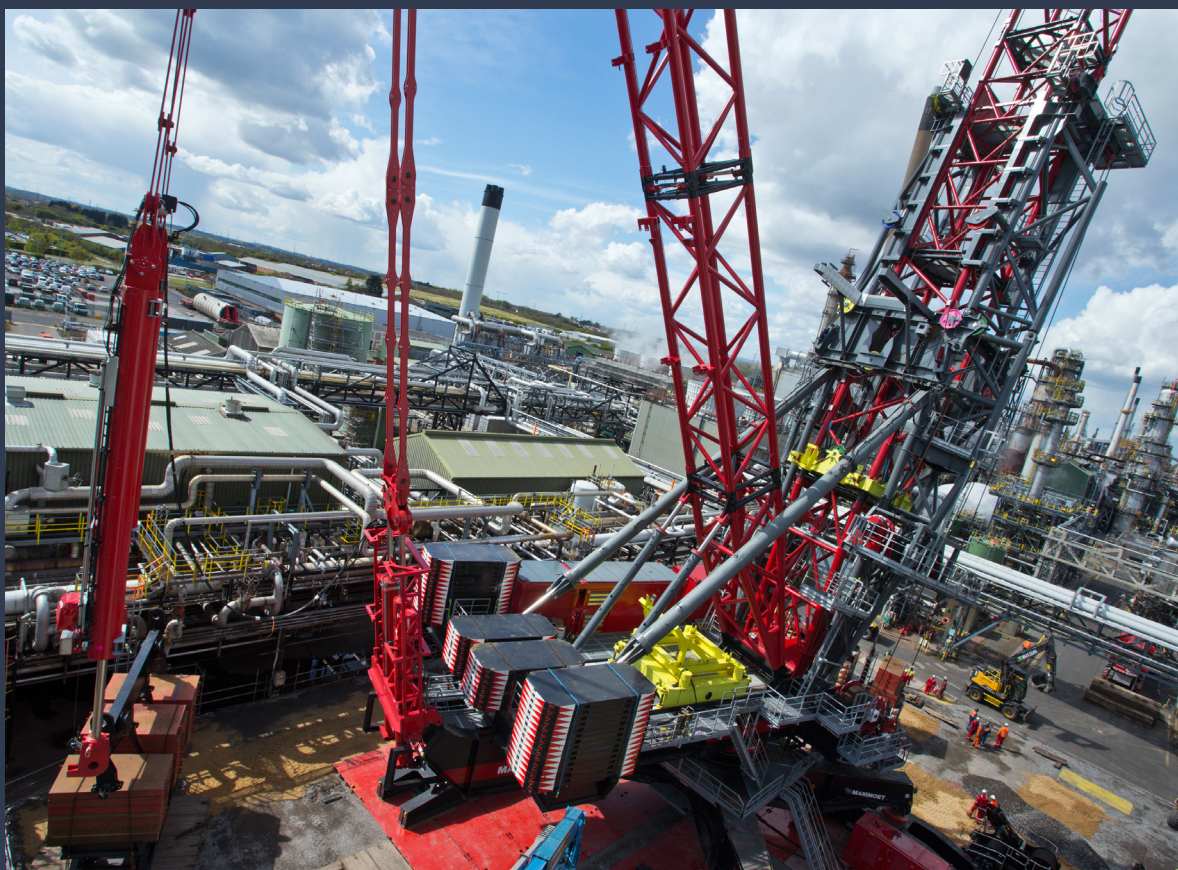
All FOCUS30 components are made transport-ready, conforming with all European regulations for road transport. Therefore, the crane can be mobilized to any location quickly, to serve urgent maintenance requirements at complex industrial sites.

MINIMAL SITE IMPACT

The crane does not overhang nearby plant during its assembly. This means that it does not need to lie over existing pipe racks or in the vicinity of workers, increasing levels of safety and allowing more site work to take place around the crane itself.



FOCUS30 MINIMIZES DISRUPTION AT COMPLEX REFINERY SITE



The innovative FOCUS30 crane helped to reduce disruption during scheduled turnaround activity at a refinery in the UK. The crane performed a top-and-tail lifting operation in tandem with a 500-tonne mobile crane, in order to install a vessel at the facility.

Key to this success was the ability to **assemble the FOCUS30 vertically in sections**, which meant no laydown area was required during assembly of its boom. This allowed it to be built away from active plant, meaning less disruption to ongoing operations at the busy site.

In contrast, if a conventional crawler crane was used then the assembly of its boom would have required building over a nearby pipe rack and caused a site road to be temporarily closed for a number of days. However, the FOCUS30 was maneuvered in sections around key infrastructure and its boom was **raised within the area of the crane's own footprint to reduce disruption**.

Mammoet first transported the new vessel approximately 3km from a local port, using 36 axle lines of SPMT. It was then positioned in a staging area so that the transport arrangement could be reconfigured to suit onsite requirements.

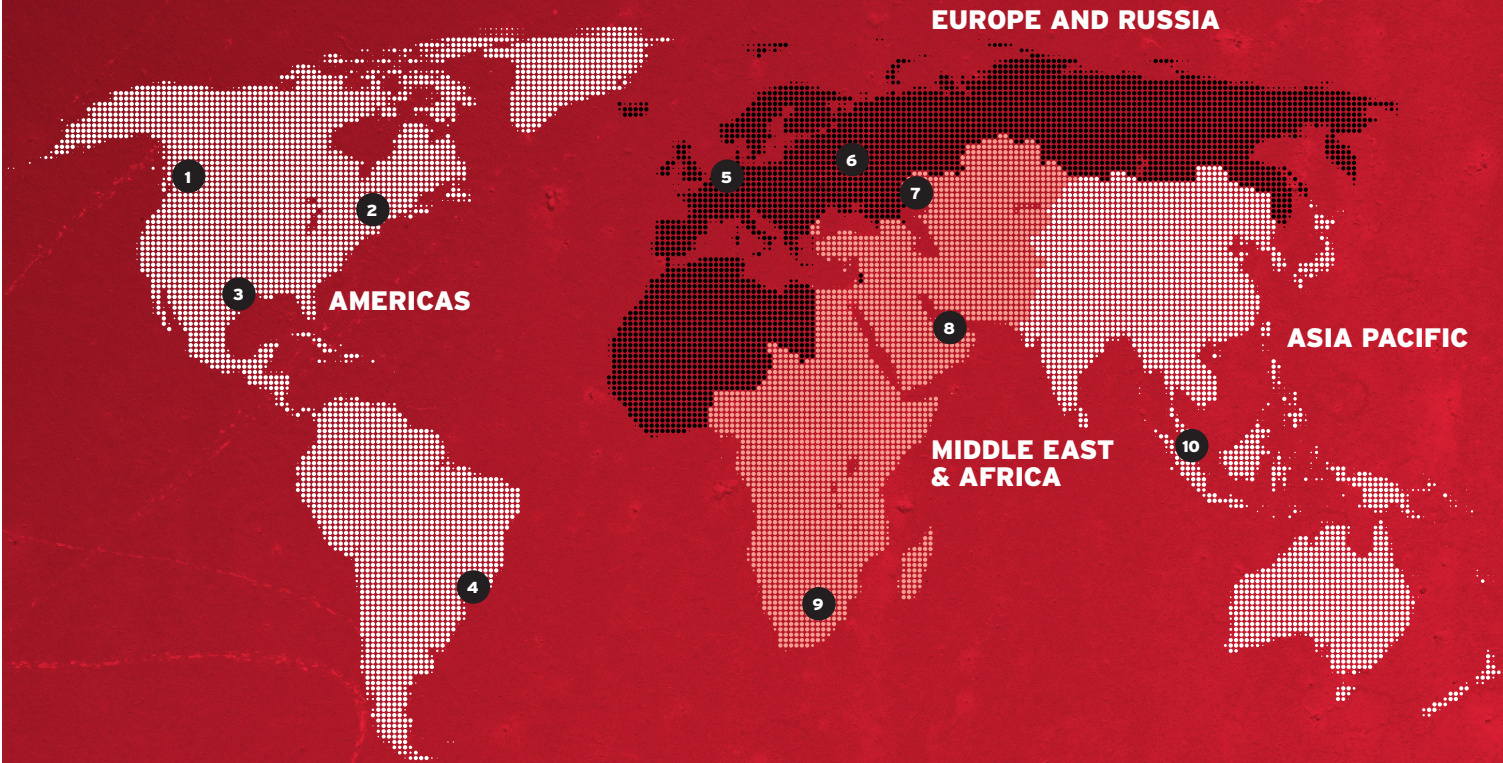
To facilitate the onsite route, a bespoke 'book end' transport frame was used, alongside the hydraulic stroke of the transporters themselves, to navigate the vessel under a number of low pipe racks. Once it reached its installation location, the FOCUS30 and mobile crane were used in tandem to lift the vessel and set it securely on its foundations.

The FOCUS30 opens up new and innovative possibilities to engineer complex lifts in equally complex environments. In this case, it drove efficiency by delivering high lifting capacity to a very compact location - allowing turnaround activity to continue in areas of the site that would have otherwise been needed to assemble a crawler crane.

MAMMOET HAS OVER 140 OFFICES AND BRANCHES WORLDWIDE.

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