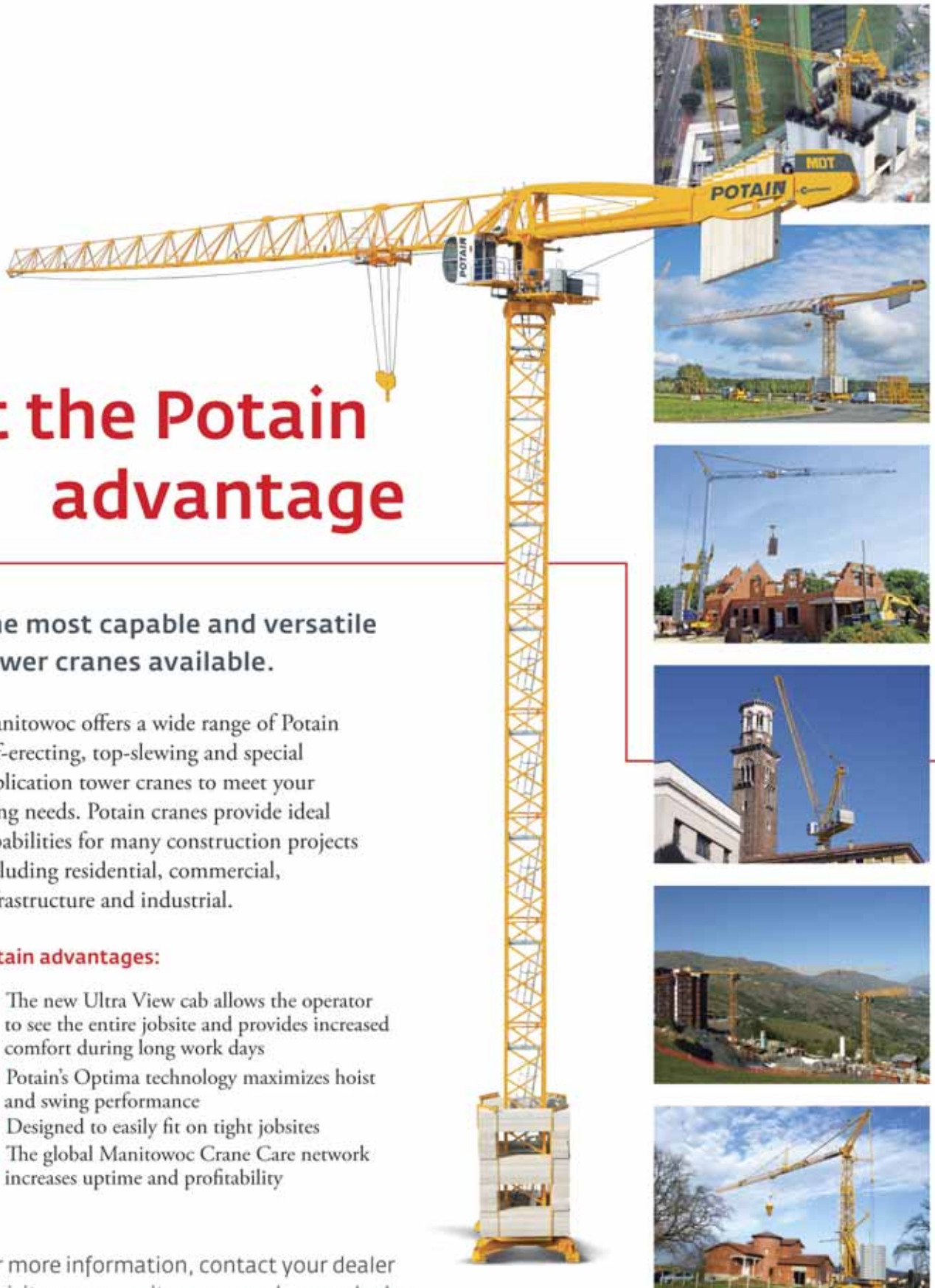
Grove Manitowoc National Crane Potain

Manitowoc



Get the Potain advantage

The most capable and versatile tower cranes available.

Manitowoc offers a wide range of Potain self-erecting, top-slewing and special application tower cranes to meet your lifing needs. Potain cranes provide ideal capabilities for many construction projects including residential, commercial, infrastructure and industrial.

Potain advantages:

- The new Ultra View cab allows the operator to see the entire jobsite and provides increased comfort during long work days
- Potain's Optima technology maximizes hoist and swing performance
- Designed to easily fit on tight jobsites
- The global Manitowoc Crane Care network increases uptime and profitability

For more information, contact your dealer or visit www.manitowoc.com/cranesdealer

Battle of the heavyweights

One sector of crane industry that still appears relatively buoyant is that of heavy lift. This is one area where clients and lifting contractors work closely together and where price is not the final arbiter. This year has seen a spate of new product launches aimed specifically at saving both time and money on the largest projects. We review some of the most recent additions to the heavy lift sector.

What is a heavy lift crane or machine? The range of 'off the shelf' equipment from the recognised crane leaders - Liebherr, Manitowoc and Terex - has grown over recent years to include crawler cranes to 3,600 tonnes and mobile telescopics to 1,200 tonnes in order to cater for the increasing demand to lift ever larger modules, thus saving work on site and work at height.

Lifting reactors

Power stations, oil refineries and petrochemical plants provide some of the most demanding heavy lift applications, with components and modules increasing in size and weight as fast as crane development can keep pace. It is becoming relatively commonplace to find components that are 100 metres long and weighing up to 3,000 tonnes. There are very few traditional cranes capable of carrying out even an installation half the length and weight. Terex's 1,600 tonne CC8800 is one such crane - although the new or soon to be unveiled 'traditional' crawler entrants to the market such as the 3,000 tonne Liebherr LR 13000, Manitowoc's 2,300 tonne Model 31000 and the Chinese 3,600 tonne Sany SCC86000TM and Zoomlion ZCC3200NP will be capable of a lot more.

Lifting device or crane?

Specialist lifting devices, so called because they use strand jacks rather than the higher speed winches used by cranes, can offer capacities of up to 5,000 tonnes and load moments of 354,000 tonne/metres. However, Mammoet's recently launched New Generation PTC cranes offer both the huge capacities, jib and speed that is more 'crane' than 'lifting device'. Whatever the definition, there is little doubt that our real life example - lifting a 1,400 tonne derrick structure - is in the super heavy lift bracket, and probably one of the heaviest 'super lifts' currently carried out.

ALE used its new Terex Demag CC8800-1 to complete a 1,457 tonne at 13.1 metre radius inaugural lift in Sines, Portugal last April - said to be the heaviest lifted ever in the field by a single Terex Demag crane

With these heavier and more difficult lifts in mind we looked at a series of lifts required at an oil refinery in Port Arthur, Texas last year, to see what 'super lift' equipment options are now available to handle such a contract should it be replicated.

The Texas lift involved exchanging coker drums - removing six old drums and replacing them with six new drums - each weighing up to 471 tonnes. However the crane first had to lift a 1,400 tonne derrick structure located on top of the existing drums at a height of 100 metres and set it on the ground. After the new coker drums were exchanged the derrick structure was lifted back into place. Because of the availability of a big lifting crane,

ALE has now built two 4,300 tonne capacity AL.SK190s

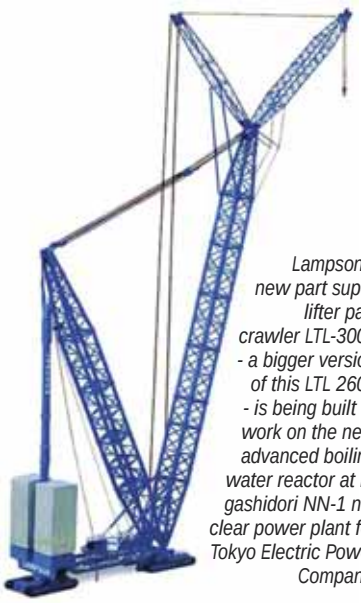
Manitowoc's 2,300 tonne capacity Model 31000 is still undergoing tests

the derrick assembly - consisting of triple drill towers and cutting deck - was lifted in one complete unit. The lift, which required a complex tackle arrangement with a 12 point pick up, was 1,338 tonnes at a 54 metre radius, which until recently would have been too much for any existing equipment. However, at least four heavy lifting devices - two launched in 2011and one still on the drawing board - now appear to have the capability to handle such a lift.

Global heavy lift and transport company ALE actually carried out the contract with its in-house designed and built AL.SK190. ALE was probably the only company equipped at the time with a sufficiently large crane or lifting devices to have handled the job. However since the launch of the AL.SK190 in September 2008, Sarens and Mammoet have launched new super heavy lift cranes, Mammoet with its new PTC (Platform Twin ring Containerised) crane and Sarens with its SGC-120 heavy lift crane, while others are shortly to become available.

California-based Bigge Crane & Rigging has developed its own 4,000 tonne capacity 125D AFRD which uses a twin boom pivoted on a support trolley similar to that employed by ALE, Mammoet and Sarens. However the major difference with its machine is that a large part of the crane is cast into the ground, including the track/ring and 3,000 tonnes of counterweight. More on this later.

A crossover crane - part super lifter and part crawler crane - is also being built by Washington-based Lampson. Its new LTL-3000 is being designed in conjunction with Hitachi Transport for the construction of the new advanced boiling water reactor at Higashidori NN-1 nuclear power plant for Tokyo Electric Power Company and should be ready in the near future. Lampson claims that the LTL-3000 will be the largest crawler crane in the world, with capacities some 20 percent better than its existing LTL-2600, and it will be designed to meet both US and Japanese standards and codes.



Lampson's new part super lifter part crawler LTL-3000 - a bigger version of this LTL 2600 - is being built to work on the new advanced boiling water reactor at Hi gashidori NN-1 nuclear power plant for Tokyo Electric Power Company.

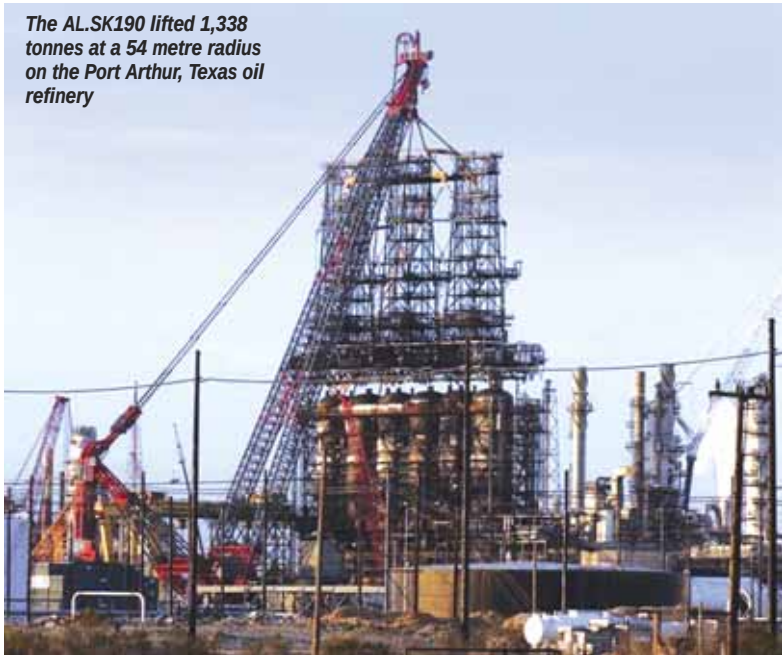
The crane will be equipped with a new hydraulic winch system using 51mm diameter wire. The new winches and larger wire rope provide a 50 percent increase in line speed. The LTL-3000 121 metre boom will have 6.1 x 4.8 metre cross section, but will maintain the Lampson pin together design concept and have a 36 metre jib.

Successful ALE lift

Getting back to the actual Port Arthur job, ALE managed to complete the project without the need to shut down any parts of the plant, the AL.SK190 was rigged outside the site boundary - a requirement that is becoming increasingly important to clients and contractors. By setting the crane away from regular site operations it allows completion of the maintenance project with minimal disruption to day-to-day operations at the refinery. Once the derrick structure and coker drums had been replaced the AL.SK190 was relocated to the refinery's hydrocracking unit (HCU), where it lifted and installed eight items including a 625 tonne, 71 metre high fractionator and three reactors ranging from 550 to 1,382 tonnes. By using existing foundations for the HCU lifts substantial time and cost savings were achieved.

The 4,300 tonne capacity AL.SK190 has a load moment of 190,000 tonne metres, a 141 metre main boom and a 32.1 metre ballast radius. It also features a 600 tonne quick winch system (150 metres an hour) for loads up to 600 tonnes but uses strand jacks (10 metres an hour) for heavier loads. The AL.SK190 uses its counterweight as its centre of rotation which, according to ALE, provides a much better working envelope as well as reducing the need to track to different positions. Unlike other large lifting machines, the ALE cranes use a segment of track rather than a full 'ring' so although slewing is limited to 90 degrees, outreach is said to be greater.

Liebherr's LR 13000 seen here with a 3,371 tonne test weight



The AL.SK190 lifted 1,338 tonnes at a 54 metre radius on the Port Arthur, Texas oil refinery

New Generation PTCs

One recent entrant into the super heavy lift arena is the closest yet to being called a crane rather than a heavy lifting device. Mammoet has had a lot of experience designing and building PTC cranes since its first in 1996 - initially with the MSG then T30, PT50, PTC35 and PTC35 DS. Since the T30 features such as winches and wheeled bogies were introduced (instead of gantry strandjacks and sliding bodies). Unlike the ALE design, the PTC sits on a full ring for slewing, but similarities include twin booms forming a stable A frame boom structure and components sized to fit into standard shipping containers. More than 10 such cranes are operational around the world with more than 17,000 heavy lifts having been completed.

Mammoet has been building PTC cranes since 1996 - here is a PTC 1 in a petrochemical application lifting 670 tonnes.

Their success means that Mammoet has further developed the concept into its new generation PTC cranes. Available in two sizes - 140,000 tonne/metres and 200,000 tonne/metres - the first PTC 200DS has been shipped for a project in Brazil and two of the smaller PTC 140DS are heading to the USA.

However there is a distinct difference between cranes such as the Mammoet MSG and the new generation PTC cranes. The latest machines are 'real' cranes and not sliding gantries or lifting machines which operate more slowly, move on skid shoes and use strand jacks for lifting. Those machines are suitable for single heavy lifts but not ideal for multiple lifts during a project. Strand wire used with strand jack systems can suffer heavy wear and often needs replacing after only a few lifts which adds to the costs and time.

Mammoet says its new generation PTC's are 'real' cranes, not sliding gantries or lifting machines.

Ground bearing pressure is 20 tonnes per square metre (4,100/sqft) for both cranes and is combined with a relatively small footprint (45 metres and 55 metres).

Mammoet says its new PTCs meet both European and American safety standards and are fully certified by Lloyd's Register with regard to design approval, fabrication survey and testing. A key design requirement was the safety of the crane's riggers during erection, achieved by providing walkways and other fall-protection measures. Mammoet's in-house designed hydraulic pin connectors are said to improve safety and save time during erection as well as reducing wear on the pins.

3,200 tonnes at a 55 metre radius!

Performance of the new PTC is obviously impressive. The crane has a maximum boom and jib height of 235 metres and a maximum radius of 205 metres - that's more than two football pitches - and the larger can take 1,000 tonnes out to a 100 metre radius, 2,500 tonnes to 65 metres and 3,200 tonnes to 55 metres. Three boom options are available - main boom, main boom plus fixed jib and main boom plus luffing jib. When using the luffing jib, load charts are provided for selected main boom angles. However for

Constructing the new generation PTC 200DS

The PTC has four 800 tonne high speed main winch systems.

Roderik (L) and Jan Van Seumeren Jr at the launch of the new Mammoet PTC cranes a few weeks before leaving the company.

greater flexibility, Mammoet's own non-stop interpolation allows lifts to be planned to make the maximum use of the crane's capacity.

The luffing jib - which can be extended from 42 to 106 metres - provides some good up and over capability, allowing the crane to be positioned closer to the lift - a major advantage over sliding gantries with fixed main booms that have to be positioned further away to reach over structures. Ground bearing pressure of 20 tonnes per square metre (4,100 lbs/sqft) for both cranes and a relatively small footprint (45 metres and 55 metres) is another advantage, particularly on congested sites. And as all ballast is carried within the ring, the PTC has zero tail swing with the slewing radius of 22 metres, which Mammoet says is the smallest of all super heavy lift cranes. The PTC can also complete a full 360 degrees of slew in just 15 minutes, the slew drive powered by redundant hydraulic power packs for increased reliability.

Four 800 tonne main winch systems - automatically synchronised and controlled - provide a total lift capacity of 3,200 tonnes, with hoist speeds of 10 metres a minute - possibly 60 times quicker than strand jacks.

Fully duplicated systems ensure reliability

One key feature that Mammoet has been pushing hard with the new PTC crane is its designed-in reliability. In order to achieve this the company has duplicated all key electric and hydraulic components such as power packs, gearboxes, slewing and hoist drives, PLCs and electronics. This not only means that the crane can carry on working when a component goes down, critical in remote locations where time is of the essence, but it also allows repairs and maintenance to be carried out without disrupting lifting operations.

The main hydraulic power pack is driven by two Caterpillar C18 engines however if one should fail or needs to be shut down for maintenance, the crane can still continue at full capacity by using the other. Should both engines fail, the crane is designed to allow it to be quickly coupled up and operated by an external power pack.

Load cells on the boom and jib and other safety systems and cabling are also fully duplicated. If there is a serious problem the crane is switched from master to back-up systems and can be operational within five minutes. If all control systems fail the crane can still be operated manually to lower the load, should it occur in mid lift. So for example if it is hit by lightning affecting the master system, the crane can be immediately switched over to the backup system and keep on going. Should the crane be affected by an earthquake and both

Mammoet designs its cranes to operate in extreme environments

50 years

LIEBHERR

Experience the Progress.

LR crawler cranes from Liebherr.

- Top capacities in all lifting classes
- Variable boom systems for diverse requirements
- Efficient application due to optimized transportation components
- Comprehensive comfort and safety features
- Worldwide customer support by manufacturer

Liebherr-Great Britain Ltd.
Normandy Lane, Stratton Business Park
Biggleswade, SG18 8QB
Phone: (01767) 60 21 00
E-mail: info.lgb@liebherr.com
www.liebherr.com

LIEBHERR

The Group

master and backup systems fail, the load is secured using manual slew, main boom and jib operation within four hours.

The PTC can operate in wind speeds up to 14 metres a second (31 mph) and the main boom can remain fully erected in wind speeds of up to 50 metres a second (112 mph). And in the very worst cases, its hurricane survival mode can cope with winds of up to 67 metres a second (150mph) and the main boom and jib can always be lowered within four hours, without the need for an auxiliary crane.

The crane can also be used in extreme environments down to minus 40 degrees or plus 55 degrees celsius without any impact on the load chart. Erection needs two mobile cranes and takes between three to six weeks.

Sarens SGC-120

The combined engineering efforts of Wolvertem, Belgium-based Sarens and its Californian-based subsidiary Rigging International, have added another heavy lift crane option. Details of the SGC-120 (3,200 tonne, 120,000 tonne/metre capacity) crane were initially issued in March 2010, with the first crane built and tested a year later. Although smaller than the Mammoet PTC its design is similar, using a compact double ring and winches.

Sarens says the twin A-frame boom crane has been designed for refinery, oil and gas, mining, offshore platform and third generation components for nuclear power plants. It is also keen to point out that the SGC-120 is a 'crane' in that it uses the faster winches rather than stand jacks.

Three main boom lengths are available - 87.5 metres, 118 metres and 130 metres - together with an 89.5 metre light duty jib. Maximum lift capacity is 3,150 tonnes at 40 metre radius. Using its light duty jib and 130 metre main boom it can lift 120 tonnes at 200 metres and maximum under hook height is very close to 200 metres. The full counterweight of 3,600 tonnes uses a total of 36, standard 40ft containers filled with locally sourced material which helps keep shipping costs as they are also used to transport the crane's components and structure.

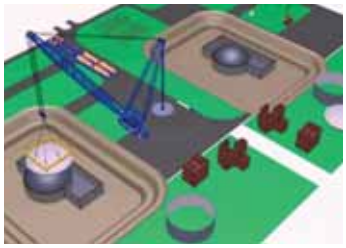
Bigge and bigger

As mentioned earlier, the Bigge AFRD 125D is similar in many ways to the other big machines, but the major difference is that a large part of the crane is cast into the ground. Designed primarily for nuclear power station construction, the crane is positioned centrally on site to handle all lifts from a single location. And by sinking and casting its foundation/counterweight into the ground, the crane's footprint remains fully open to site traffic. This concept only works if the crane can cover all the required lifts from a single location. Its 171 metre, twin main boom and 64 metre fixed jib certainly gives it an impressive working envelope with a claimed 45 tonne capacity at a 241 metre radius. It can also take 3,640 tonnes out to 73 metres.

Bigge says that the new crane has been designed with lower ground bearing pressures, higher tolerance for lifting in windy conditions and higher hoist and slew speeds and that the design concept can be expanded to lift around 7,000 tonnes.

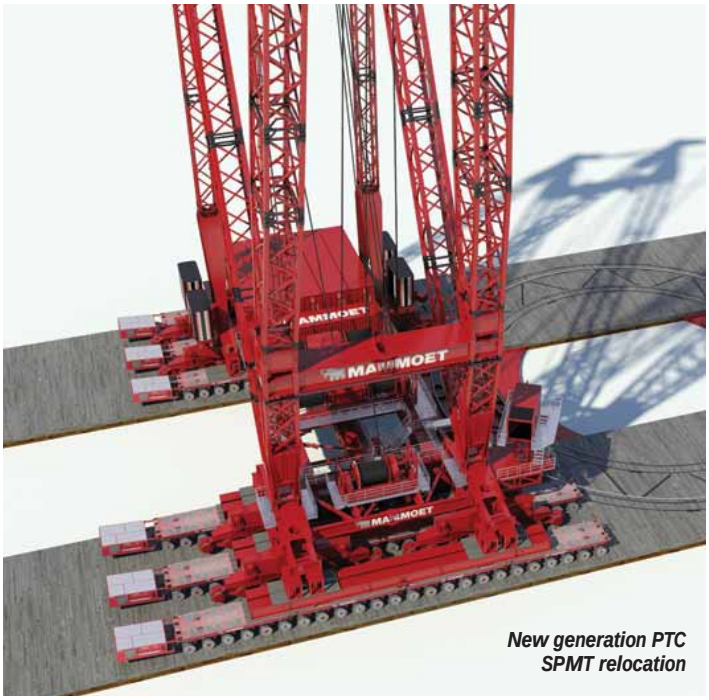
The introduction of these super cranes and their improved lifting performance provides project planners, designers and contractors more choice and the opportunity to further increase module sizes and weights. Let us hope that in the current global financial crisis and a renewed nuclear debate - following the disaster in Fukushima - that demand all these big cranes remains strong.

Sarens tested its 3,200 tonne, 120,000 tonne/metre capacity SGC-120 early in 2011



The Bigge AFRD 125D is similar in many ways to the other big machines, except that a large part of the crane is cast into the ground allowing site traffic access.

Sarens super crane SGC-120 hook block



New generation PTC SPMT relocation