

Essar turnaround

Raising the roof to boost the bottom line

At Essar Energy refinery in the UK, the cyclones, which are at the heart of the refinery to separate process catalysts, were coming to the end of their operational life after 25 years and needed to be replaced. Although the operation took four years to prepare and develop, the final execution was undertaken during a 30 day turnaround.

Removing the cyclones through a large hole in the regenerator shell would have taken 60 days. To save time, it was decided to remove the entire regenerator head including the cyclones from the top of the shell and replace both. This approach saved Essar a full 30 days of turnaround time.

In alliance with turnaround specialist Foster Wheeler, Essar scheduled the turnaround four years in advance, to take place in October 2013. Mammoet was contracted to engineer and manage the transports and lifts required to remove and replace the regenerator head and cyclones, a project that involved dealing with tight space and time constraints.

Historic milestone

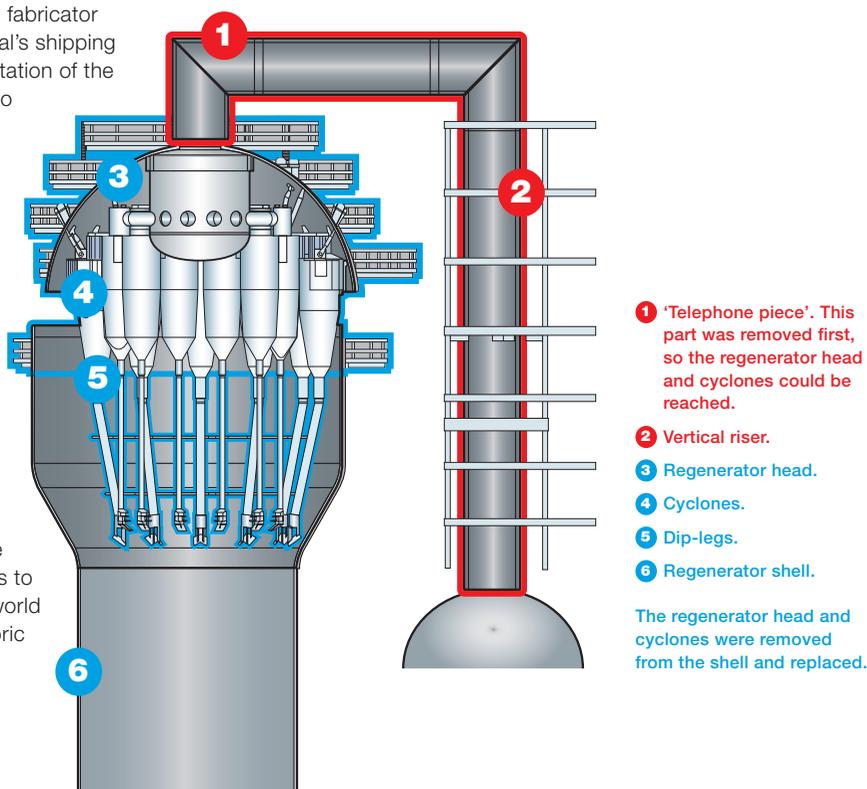
As part of the integrated approach, Mammoet took care of the transport of the new regenerator head. First, under contract from the Belgium fabricator Ellimetal, Mammoet supported Ellimetal's shipping contractor in the loading and transportation of the new head in two sections from Genk to Antwerp, Belgium. Once in Antwerp, the head was assembled, and prepared for its sea voyage. Subsequently, it was loaded onto a barge for shipping to the UK. At Ellesmere Port, the regenerator head was offloaded and stored.

On the exact date that was set two years in advance, the new regenerator head was carried on a train of 30 axle lines of double wide SPMTs from Ellesmere Port to the Essar Energy refinery at Stanlow, five kilometers away. Combined, the SPMTs and its cargo weighed 700 tons. This was the largest regenerator head with cyclones to be fabricated and transported in the world and, according to Essar, it was a historic milestone and investment for Stanlow.

"The transport had been very well planned in advance, but close to the transport date we had an unforeseen obstacle", says Paul Nixon, Mammoet's Senior Project Manager for the Essar assignment. "As is standard practice with a transport of this size and weight, the Area Engineering Agency (acting for the Highways Authority) carried out assessments of all the structures that the transport would traverse along the route, and how that weight could best be distributed to ensure the safe passing of the transport and avoid damage to the roads or any of the bridges and culverts on the route.

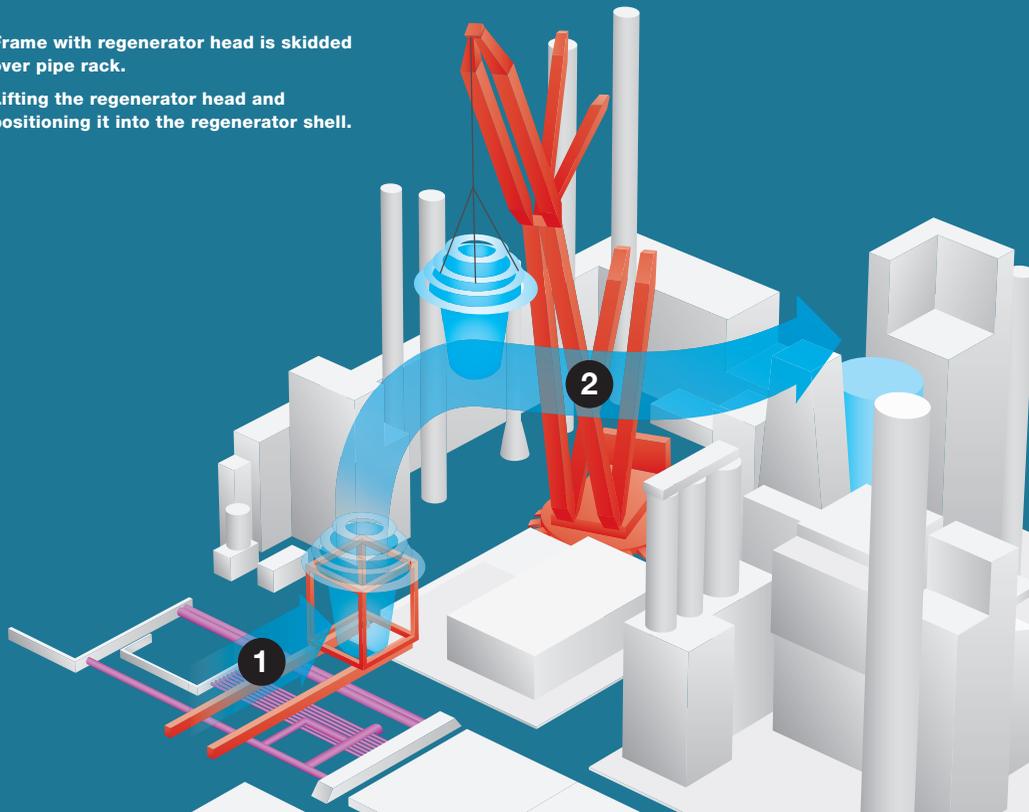
This process was a critical part of the long term planning, and part of the approval process that had been agreed many months in advance, allowing Mammoet

The new regenerator head and cyclones on their way from the temporary head frame to their final destination.





- 1 Frame with regenerator head is skidded over pipe rack.
- 2 Lifting the regenerator head and positioning it into the regenerator shell.



to provide the optimum number of axle lines to meet with the agreed load case. However, two months before the transport date, a new Area Engineering Agency was appointed by the Highways Authority. They revised the assessments and specifications that Mammoet had based its plan on and, subsequently, we needed to adjust our plan to their new findings.”

That meant going back to the drawing board in the midst of turnaround preparations. The key solution for the transport was to increase the trailer length and the number of axle lines—the permit was issued just in the nick of time, and Mammoet delivered the new head to the site as scheduled.”

“Having to focus on multiple work fronts at the same time, reworking all the plans for the transport while pressing ahead with on-site preparations was a challenge for us”, says Paul. “But in fact it was not the biggest one we faced. The toughest part of the entire job was fitting the PTC crane and the skid-beam system into a really tight location on-site. This task was managed by Senior Project Manager Anja den Braber, who executed the entire on-site scope for Mammoet.”

Exact fit

Anja’s job was quite a challenge. With tight time and space constraints, the execution had to be flawless. Well in advance of the lifts, Mammoet provided Essar with a 3D model of the crane, which was then put

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together with a model of the plant that had been generated from laser scans—ensuring that all lifts would steer well clear of existing equipment.

The space constraints also necessitated special solutions for transporting the regenerator head through the refinery as well as storing and skidding it prior to the lifting operation.

Once the transport had arrived at Stanlow, Mammoet first had to jack up the head two meters and reduce the SPMT train from a double 30 line trailer to a double 22 line trailer, enabling it to pass through the site. Next, the head was lifted into one of two awaiting frames, assembled to store both the new and the redundant head. Ideally, these frames would have been positioned next to the crane. However, in the area where the PTC was assembled, there was no room left for the frames. Therefore, they had to be stored at a different area, which was out of the crane’s reach.

The PTC area and the storage area were separated by a pipe rack, which presented a road obstacle. This meant the regenerator head could not be driven to the crane on a SPMT. This issue was resolved by constructing a skid system comprising two 38-metre-long gantry beams that had previously been used in the raising of the Russian Kursk submarine, affectionately known at Mammoet as 'Kursk beams'. This approach made it possible to skid the regenerator head towards the crane and lift it in its complete, assembled state through the tight space of the refinery.

To enable this approach, Essar and Foster Wheeler had designed a support interface with the site's underground infrastructure so the skid system could be built over the pipe rack safely.

Meanwhile, the PTC ring crane, which was delivered to Stanlow in no fewer than 120 containers, had been assembled in its designated area.

On 12 October 2013, the turnaround sequence began, right on schedule. After the top part (including the 'telephone piece') of the regenerator shell was removed, the old regenerator head was removed and placed in the designated head frame. The new regenerator head, including cyclones and

dip-legs, was skidded towards the crane and then lifted into the shell, after which the top part was replaced.

The whole job, with its countless complexities and meticulous attention to detail, was done within the 30 days that Essar had required.

After the job was finished, Mammoet took part in a lessons-learned session with all the other contractors involved. Paul Nixon was there with other members of the Mammoet team. The aim was to determine if improvements could be made that would help with future projects. "After all of the engineering and planning undertaken to meet the various challenges, we were very pleased to hear Essar say "Mammoet was the right contractor for this project", says Paul.

"This project collaboration has deepened the relationship with Essar, and indeed we are now executing other significant projects at Stanlow. For example, we are using a gantry system to support a furnace that needs refurbishing. That project is going very smoothly. But smooth sailing or not, it is the commitment to getting the job done safely and on time that is key in helping Mammoet customers successfully." ■

Partners with the right expertise

Mammoet World spoke with Allan James, Senior Project Manager, and Paul Cook, Construction Manager, at Essar oil UK, to learn about their experiences with this project.

What, for you, was the biggest challenge you faced in the turnaround as a whole?

Allan: "It was working in a live environment. We recognized from the start that safety was paramount, and we were delighted that the entire project was finished with zero incidents and zero injuries. It made our lives easier knowing we were working with a partner we could trust to work safely, especially when both time and space were so limited."

There were a lot of different teams working at the same time on this outside project. How did that work out?

Allan: "We first started looking at this turnaround in 2009, and well before the new head had even arrived in the UK a lot of preparatory studies needed to be carried out. For example, Mammoet did a transport study, and a feasibility study on what kind of crane would be best to do the six major lifts. Of course coordination of all this preparatory work is key, and Mammoet did everything that was expected of it on the score. But the other thing we needed here was continuity. Continuity matters. For this job, there

was the lead-up to the turnaround and the job itself. On Mammoet's side there were one or two changes on-site, most notably when they brought in a new project manager, Anja den Braber, as the initial project manager Paul Nixon was needed elsewhere at Mammoet. Bringing in someone new at that point raised some small concerns initially, but Anja quickly put those to rest, fitting in and getting down to brass tacks-she turned out to be a success factor. And I have to say that that's true of the whole Mammoet team."

Paul: "On a job like this, you don't just want the team there for the major parts-the transport, the major lifts, and so on. There were 120 containers needed for the PTC, and it was a big job putting it up. That means it was also going to be a big job taking it down again, still in a live environment. Another outfit might have switched out key members of its team once the biggest operations had been carried out. But Mammoet stayed with us, with the same core team, until the job was not just done, but done and dusted. And we certainly appreciated that."

What did you take away from the lessons learned session?

Allan: "There are always lessons to be learned, but then again there will always be unexpected obstacles as well. Mammoet itself had had to deal at the last minute with changes to some of the specifications for the road transport from Port Ellesmere to the site-and yet they were able to do the transport on the day we had picked a full two years beforehand."

Paul: "And that's one reason why, when a furnace went out of commission during this project, we were pleased to ask Mammoet to do the lift that was needed to make the repairs."

Allan: "That's a third thing you look for in a contractor: not just reliability, but flexibility-the ability to roll with the punches, so to speak. The Mammoet team did that. We picked the turnaround date four years in advance, and the transport date two years before delivery. Mammoet made both deadlines without any delays. Having a reliable partner with the right expertise is paramount, and we have already contracted Mammoet again since the turnaround."