# When Two Become One – Creating the World's Largest Jackup

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**Abstract**

The offshore oil and gas boom of the late 20$^{th}$ century led to the construction and installation of thousands of offshore production platforms worldwide. More recently, efforts have turned to removal of these massive structures. This decommissioning boom creates new challenges and opportunities for the offshore services sector. In 2019, Petrodec started operating in the Decom sector and is tasked with large complex decommissioning of production installations in the UK SNS over the next 20 years. To take on this task in a safe and cost-effective manner required a new approach. The Petrodec team got hold of two KFELS/Friede and Goldman L780 Mod VI jackups (twins) and approached Seatrium Offshore Technology with an idea, and a challenge, to combine the two jackups to create a customized single decommissioning unit; the seeds for OBANA had been planted.

## 1. Introduction

The offshore decommissioning market requires contractors to work under the highest safety and environmental protection standards and at the same time control and lower the costs as much as possible. The project schedules are often influenced by fluctuating oil and gas prices while the availability of offshore heavy lifting equipment is limited. This combination of partially contradicting requirements were the drivers for Petrodec to develop a unique approach in the decommissioning industry.

The Petrodec approach is to combine the plugging and abandonment of wells, cleaning and make safe of all process equipment and pipelines with the preparation and subsequent execution of the structural removal of the installations.  To combine these simultaneous operations in the most efficient manner, Petrodec takes over the operatorship of the redundant installations. This allows execution of operations and maintenance under the Petrodec Integrated Management System dedicated to decommissioning activities. This "one stop shop" approach leads to internalizing many of the key capabilities and utilizing synergies along all project phases.

Besides the patented topside skidding system and a 300mt pedestal crane deployed on Petrodec's ERDA jack-up rig, Heavy lifting capacity is a key capability for the structural removal which Petrodec was missing. To address this gap, internal development activities started in early 2021 to design a heavy lift jackup.

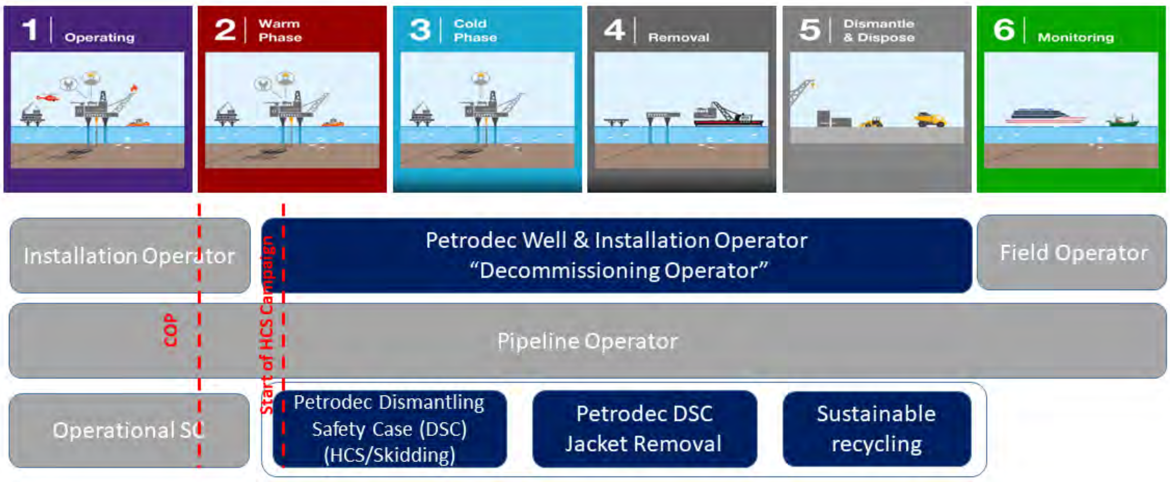


Figure 1: Petrodec integrated approach as Decommissioning Operator

## 2. Opportunity Meets Sustainability

Built by Keppel FELS for Global Santa Fe (GSF) in the late 1990s, Galaxy II and Galaxy III, were two of the largest jackups at the time. Measuring 244 x 250 x 36 ft, and supported on 50ft triangular legs, the units were equipped with a 3 stack OTD 1000FV jacking system and fixation systems, allowing operations in 400ft water depths.

The units operated successfully as drilling units for many years until, in 2014 and 2015, the units were stacked as demand for drilling reduced. Still in good structural and working condition, with hope of providing them with a second life, Petrodec acquired the GIII unit in 2021 and, with the design of OBANA already underway, GII was saved from a scrapyard in Denmark in 2022.

**Figure 2: Galaxy II at scrap yard (left), Galaxy III at cold stack location (right)**

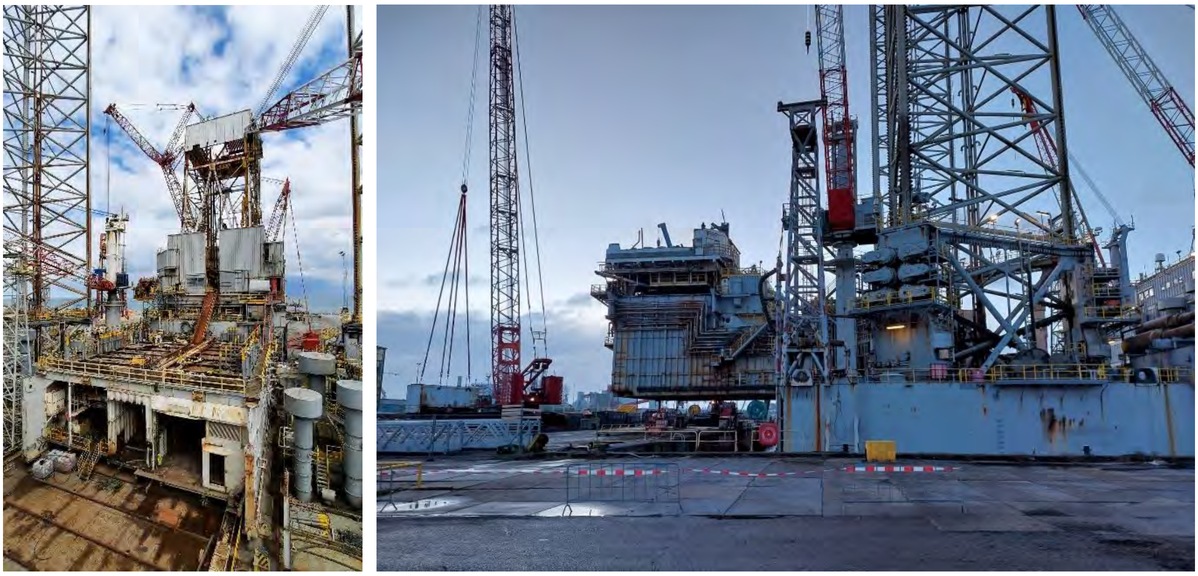

**Figure 3: Cantilever and derrick removal (GII left, GIII right)**

Meanwhile in Rostock, Germany a 2000T Liebherr MTC78000 offshore crane had sat undelivered and unused for more than 10 years as its original purpose had been discontinued. Although never installed, the crane was offered as a second-hand crane and critical components had been maintained and preserved over the years.

**Figure 4: MTC crane components in storage**

While the existing parts meant that the design would need to be very different from a newbuild approach, the possibility of reusing such a high percentage of existing assets was compelling. Re-use of old, written off assets to create a sustainable solution aligned well with the core values of the company from economical as well as ecological point of view. When all was added up, 85% of OBANA's total weight would come from these re-used components.

## 3. Making OBANA a Reality

In late 2021 the first concept of OBANA was drafted based on the idea to combine two existing drilling jack-ups. Over the next 3 years the project progressed rapidly, with design beginning in parallel with procurement and condition assessment of the existing assets. Coordination of project management, design, procurement, fabrication and approvals, were slotted in seamlessly as OBANA evolved.

Working within the limitations of the available parts, the unusual geometry of this 6-legged giant jackup triggered unique but conservative adaptation of Classification Rules to suit the design. ABS was engaged from the beginning, aligning on the approaches and approval methods that would be used to develop and finally approve the design.

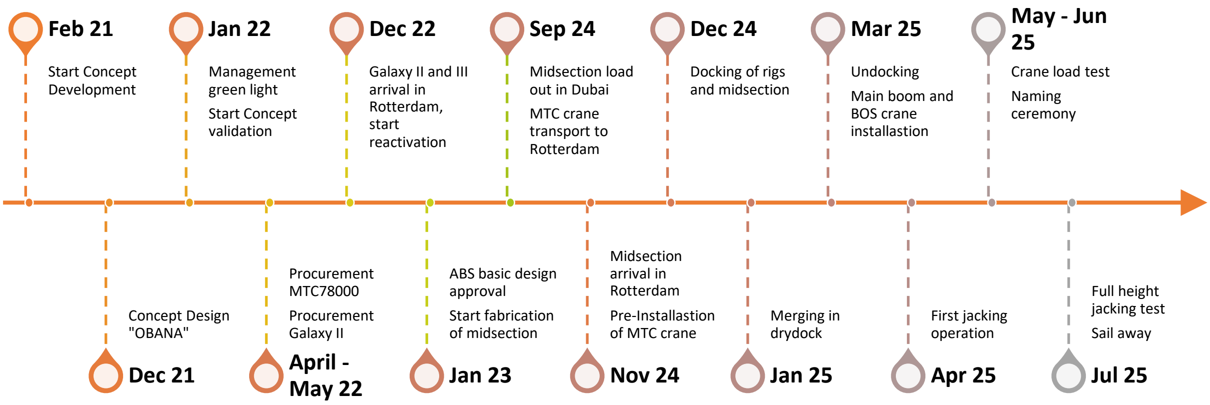


**Figure 5: Timeline of key events**

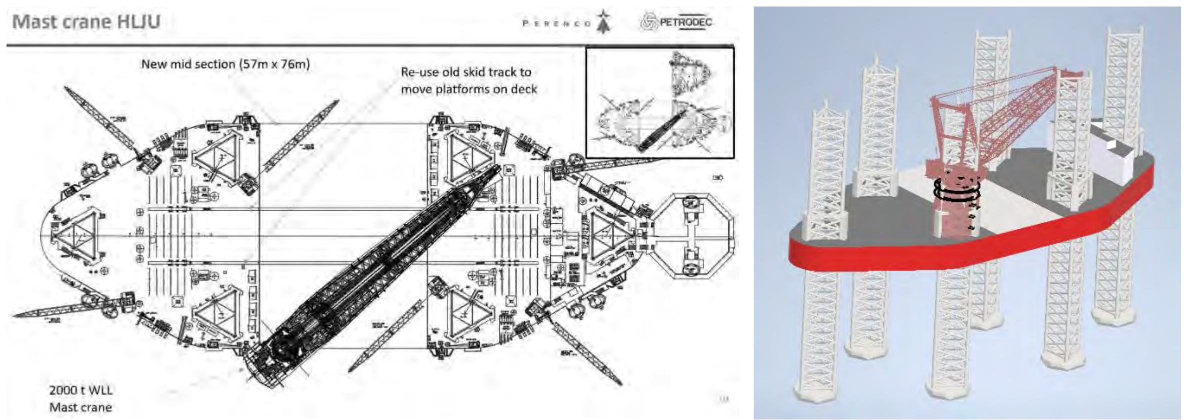


**Figure 6: Early sketches of OBANA highlighting key functionality**

## 3.1 Arrangements and Structural Integration

### 3.1.1 Deck Space and Lifting Functionality

From the first concept discussions, key requirements for the vessel were identified, including the required lifting capacities and deck space to accommodate the removed structures. The space requirements for installation of the heavy lift crane as well as the need for sufficient deck space with high deck load capacity led to the integration of a new-build midship section. This alone was insufficient to provide the required space however as crane reach would not be able to cover the massive extent of the integrated deck. To overcome this, a key piece of the strategic planning and design development was the development of the deck transfer system. A combination of deck tracks, grillages and electric trolleys for transporting structures on deck beyond the crane reach, the system allows full utilisation of the available deck space.


**Figure 5: Deck transfer system grillages and tracks (top), Trolleys under the grillage (bottom)**

The ability of the crane to reach outboard to the target structures also needed to be enhanced as much as possible. To achieve this a novel pedestal design was developed, allowing the crane to extend outboard of the main deck, effectively increasing available reach. Structural design of such a pedestal, for a 2000T crane, was a challenge, with the final arrangement taking shape following several design and analysis cycles. The unique pedestal design, flush with the side-shell at deck elevation and extending 50% outboard at higher elevation, allows closer approach of the jackup to the installation while having better load outreach outboard. The pedestal design not only optimizes outboard crane reach but also usable deck space in combination with the outboard crane boom rest, avoiding obstruction of high pieces of equipment, such as jackets, on main deck.

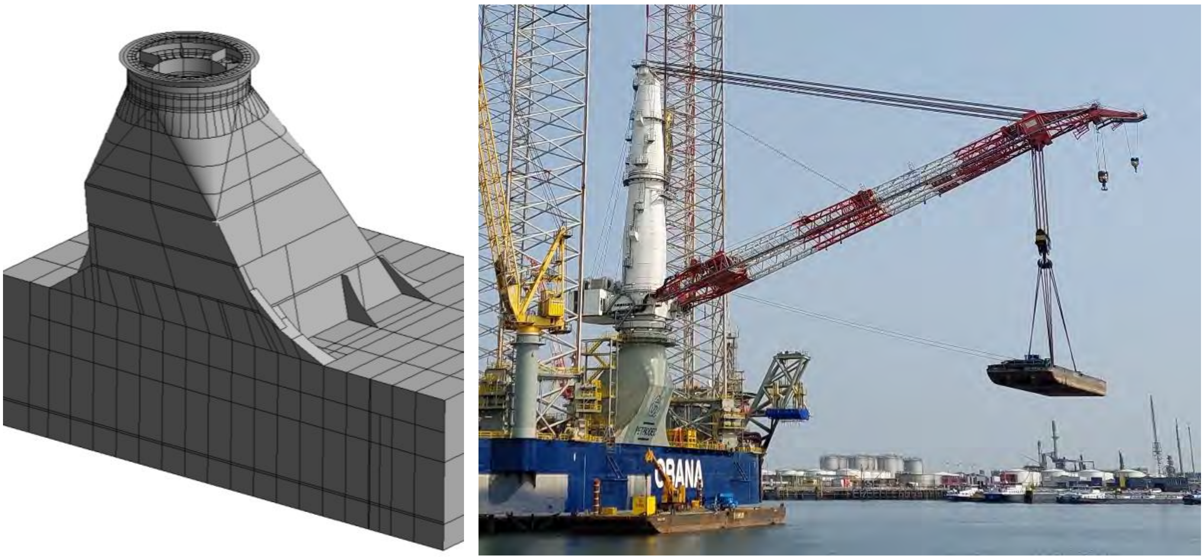


**Figure 6: A novel crane pedestal extends the outboard reach and maximizes deck space**

### 3.1.2 Structural Design Integration

Structural design and seamless integration of the new Midship Body, built by Dubai Drydocks World, with the transom of the two huge jackup units was key to success of the concept. The midsection and connections needed to provide the required strength to support cargo when elevated, as well as during afloat transit and under complex diagonal preload conditions; all conditions being largely different from the original design loads of the hull structures. Operating procedures and loading conditions were carefully defined to maintain allowable stresses for each mode of operation.

The fit for purpose design of structural strength ensures robust resistance against environmental loads during the planned operations with contingencies for emergency scenarios and optimizing steel weight by avoiding unrealistic generic load conditions. Additional monitoring systems for leg load measurement and assessment of hull deflections provide additional safeguards to operate the unit within the design limits.


**Figure 7: Hull stress during pre-loading (left), jacking trials (right)**

**Figure 8: Midsection fabrication (left), preparation of GII and GIII transom (right)**

To achieve the required integrated strength, strong longitudinal bulkheads within the new midsection were aligned with the existing structures at the transom and the interfaces reinforced with selective replacement of critical areas to ensure smooth stress flow. During fabrication the connections penetrated into the GII and GIII structures in order to further ensure a proper connection. For reduced time in dry dock the interfaces from the existing rig to the new-build midsection were prepared while both rigs were jacked-up undergoing reactivation. Corse alignment of the three structures was performed afloat inside the drydock by ballasting the structures to different drafts and setting them on the dock blocks one by one. Finally, the structural merging in the dock was achieved by moving the midsection against the Galaxy III with hydraulic skid shoes and subsequently skidding Galaxy II against the midsection.


**Figure 9: The Midsection and GIII are introduced to each other before merging**

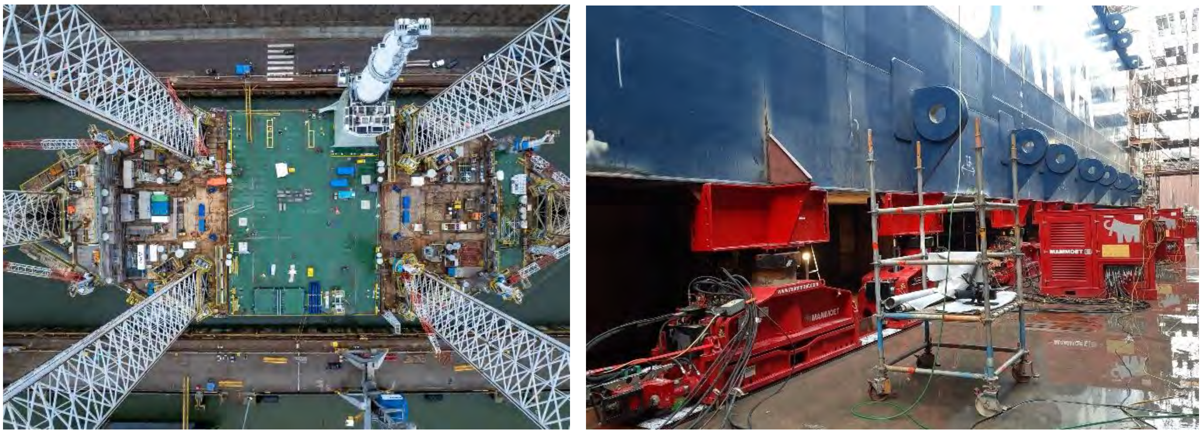

**Figure 10: Alignment prior to skidding (left), skidding of midsection (right)**

The 6-legged layout of OBANA provides unique opportunities and challenges at the same time. Each leg weighs more than 3000mt creating a significant bending moment on the hull in afloat condition. This hogging moment is further increased by the large amount of buoyancy created by the midsection. To overcome this, the midsection is designed with a free flooding double bottom to create a better balance between buoyancy distribution and weight distribution while limiting the amount of required ballast water.

In elevated condition the 6-legged arrangement leads to an indeterminate support condition requiring leg loads to be measured and controlled throughout all steps of the operation, but especially during jacking and preload. The jacking system was retrofitted with torque transducers allowing for permanent measurement of pinion/leg loads. Based on FEM analysis of the hull structure, the capacities of the jacking system and the leg strength, target permissible static leg loads are derived. These static leg load limits include a sufficient margin for environmental and operational loads during heavy lifting activities as well as storm survival mode.

The measured leg loads are compared with leg load estimations from the rig's loading computer that estimates the expected leg loads based on a weight distribution algorithm. This allows monitoring of each step during the project execution.

### 3.2 Systems Activation and Integration

While the structural integration works are visibly prominent, a substantial portion of the effort was focused on the vessel's internal systems—particularly the jacking control systems, each over 20 years old, inherited from Galaxy II and Galaxy III. These systems, while robust in their time, presented significant challenges due to the obsolescence of some of the key components, raising concerns about reliability, maintainability, and compliance with modern standards.

Many control modules, sensors, and interface units were obsolete and no longer supported by their original manufacturers. This created risks in sourcing replacements and maintaining long-term operability. The aging components posed risks of intermittent faults, degraded performance, and increased maintenance overhead.

Original system documentation was incomplete or outdated, complicating reverse engineering and compatibility assessments, while the legacy systems did not meet current classification standards for control system redundancy, fault tolerance, and alarm management.

These challenges necessitated a strategic and technically sound approach to ensure safe and reliable integration without resorting to a full system replacement.

### 3.2.1 Strategic Assessment and Planning for Legacy System Challenges

To address the legacy system risks, a targeted site survey and inspection of the jacking systems was conducted. The goal was to assess the current condition of each system and identify components that were critical to safety and functionality.

As the Original Equipment Manufacturer (OEM), the SOT team was uniquely positioned to perform an in-depth evaluation of the existing system. This expertise enabled the development and execution of a retrofit plan that aligned with both operational requirements and long-term sustainability goals.

The assessment included component categorization and failure mode analysis resulting in a selective replacement strategy. Instead of a full overhaul, only essential components, such as outdated PLCs, communication modules, and safety relays, were replaced.

Engineering teams conducted interface compatibility checks to ensure new components could integrate seamlessly with retained hardware. The plan balanced technical risk with budget constraints, ensuring that safety and reliability were not compromised while avoiding unnecessary expenditure. This hybrid integration model preserved functional legacy elements while introducing modern control capabilities.

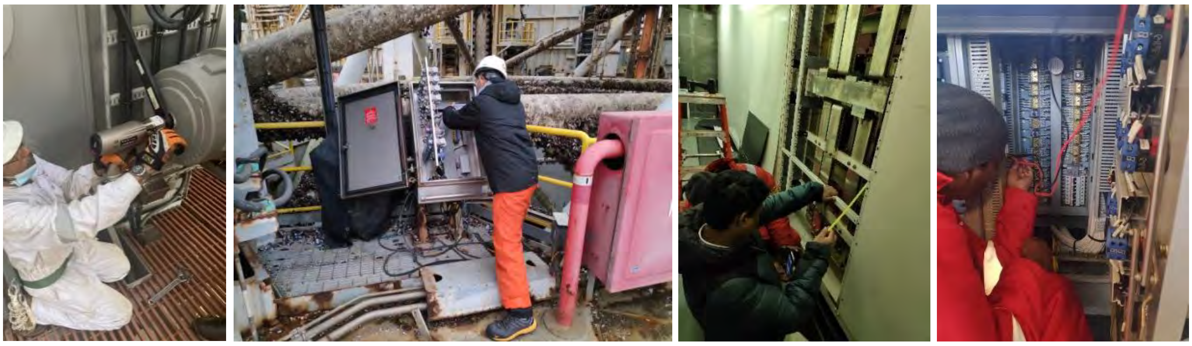

**Figure 13 Detailed site inspection of existing control system components before retrofit**