MARINE CONTRACTORS

Equipment

Heerema Marine Contractors

Sleipnir

Heerema Marine Contractors (HMC) is proud to introduce her new semi-submersible crane vessel: Sleipnir. The vessel will be equipped with two cranes of 10,000 tonnes lifting capacity each. The introduction of the Sleipnir enables HMC to meet customers' demand for lifting capacity beyond what the market can currently offer without compromising the robustness of the traditional lifting methodology that has proven itself since the founding of the company 55 years ago.

Sleipnir's features – such as lifting capacity, motion behavior and large deck area – all contribute to a superior performance of the vessel. This makes it the best technical and most effective tool for performing the offshore installation of small, large and complex facilities from shallow to ultra-deep water. With the introduction of the Sleipnir, HMC shows commitment to its clients towards the future and the ability to continue to serve the heavy installation and removal market for the next decades. This latest step in our fleet renewal program further reinforces our aim to remain an industry leader in offshore installation and removal services.

UNIQUE LIFTING CAPACITY AND CRANE DESIGN

The unique lifting capacity and crane design of the vessel allow our clients to design larger and/or heavier topsides and jackets, which we can install fully integrated and commissioned.

This relocates the expensive offshore integration to an optimized onshore activity. The uniqueness of the crane is the boom design configuration in combination with the lifting capacity. This allows heavy lift installations even on high elevations.

EXCELLENT WORKABILITY

The design of the columns of the Sleipnir has been optimized to achieve maximum workability during lifting operations all around the world including swell dominated areas, offering our customers execution and schedule predictability.

A LARGE DECK AREA

The deck configuration of the vessel has been optimized to transport as many jackets, topsides or modules as possible. This way, the workability of the offshore operation improves significantly.

TRANSIT SPEED

The new vessel will have a minimum service speed of 10 knots. Such transit speed will improve travel time between projects and will provide our clients with reduced overall mobilization duration and cost. Next to this, Sleipnir will be more environmentally friendly in fuel consumption.

ENVIRONMENTAL FOOTPRINT

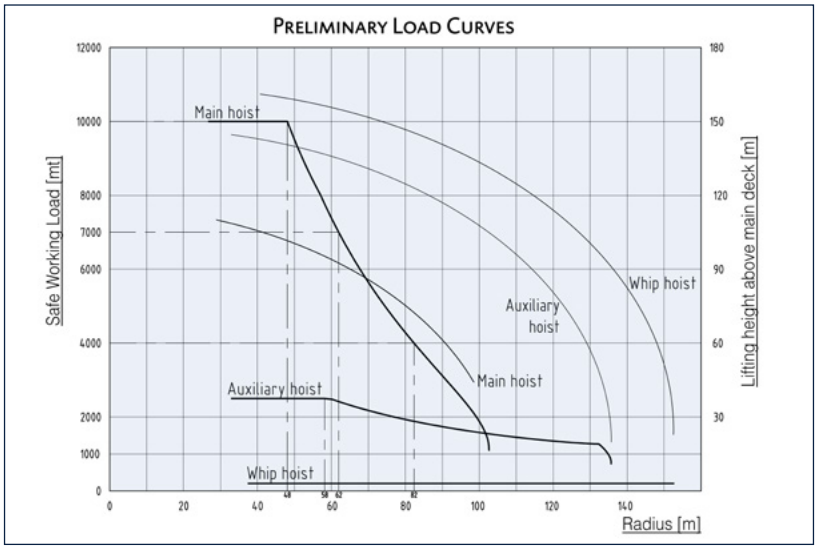
In order to improve the environmental footprint of our operations, the Sleipnir will be powered by LNG. This feature might also support our clients' environmental and sustainability ambitions.

SERVICES

With the introduction of the Sleipnir we can provide our clients with tailor-made solutions for:

- Installation of fixed and floating platforms
- Removal of offshore platforms
- Installation of subsea structures

Two cranes, 20,000 tonnes lifting capacity



Main Dimensions

Length overall	220 m
Beam Overall	102 m
Draft Range	12 - 32 m

Deck Load

Heavy Lift Lay Down Area	15 mT/m^2
Main Deck	10 mT/m^2
Total Deck Load Capacity	20,000 mT
Total Deck Area	12,000 m^2

Accommodation

Person	400 Persons
Cabins	Single and double cabins

Helideck

Diameter	28 m
Load Capacity	15.6 mT
Suitable for	Augusta Westland EH101/ Sikorsky S-92
Compliant to	IMO, LR, NMA, CAP437

Auxiliary Crane

Deck Crane	One pedestal mounted, lattice boom crane
	70 mT at 12 m radius
	25 mT at 60 m radius
	8 t at 72 m radius
	Range up to 2,000 m water depth
	Man riding certified

Portside and Starboard Heavy Lift Cranes

Type	Portside and Starboard bow mounted, Fully revolving, Tub crane
Boom Length	144 m (from heel point to whip hoist)
Boom Clearance (to deck)	28.0 m in stowed position
Main Hoist Capacity – Revolving	10,000 mT between 27 - 48 m radius
	7,000 mT at 62 m radius
	4,000 mT at 82 m radius
Main Hoist Lifting Height	from -20 m up to 129 m (above waterline at 32 m draft)
Main Hoist Maximum Radius	102 m
Auxiliary Hoist Capacity - Revolving	2,500 mT between 33 - 58 m radius
Aux. Hoist Lifting Height	from -50 m up to 165 m (above waterline at 32 m draft)
Aux. Hoist Maximum Radius	135 m
Whip Hoist Capacity – Revolving	200 mT between 37 - 153 m radius
Whip Hoist Lifting Height	from -100 m up to 181 m (above waterline at 32 m draft)
Whip Hoist Maximum Radius	153 m
Deep Water Lowering	heave compensated capacity per crane 1,000 mT at 1,000 m below sea level 760 mT at 1,500 m below sea level 240 mT at 3,000 m below sea level

STATION KEEPING / PROPULSION SYSTEM

Thrusters:

Forward end – Four (4) retractable, underwater demountable fixed pitch, variable speed azimuth thrusters of 5.5 MW each.

Aft end- Four (4) underwater demountable fixed pitch, variable speed azimuth thrusters of 5.5 MW each.

DP System:

IMO equipment Class 3, Lloyd's Register DP(AAA)

Mooring System:

4 x 3 point mooring system

Stevpris Mk-6 anchors of 12 t each

Thialf

Thialf, the second largest Semi Submersible Crane Vessel (SSCV) operated by Heerema Marine Contractors (HMC), is capable of a tandem lift of 14,200 t. The dual cranes provide for depth reach lowering capability as well as heavy lift capacity to set topsides. This multi-functional dynamic positioned SSCV is tailored for the installation of foundations, moorings, SPARs, TLPs and integrated topsides.

Accommodation / helicopter deck
The living quarters are equipped to accommodate 736 men. All quarters have heating and air conditioning facilities. The helicopter deck is suitable for a Boeing Chinook 234 (21 t take-off weight).

Life-saving / fire-fighting
Life-saving and fire-fighting equipment according to the latest Class and IMO requirements.

Mooring system
12 Delta Flipper anchors of 22.5 t each, on 3 1/8 inch wire ropes of 2,400 m (7,874 ft) long. Minimum breaking strength 480 t.

Ballast system
Ballast pump capacity 20,800 cubic m3/hour.

Power supply
The Thialf is equipped with 12 diesel engines with the following capacities:
• 6 x 4,900 kW • 4 x 4,500 kW • 2 x 5,500 kW

Diving system
Containerized saturation diving system with diving bell can be made available.

Deck load
• Deck load capacity 15 t / m2
• Total deck load capacity 12,000 t

Transit speed with 1 tug
• Max. 7.0 knot at 12.5 m draft

MAIN HOIST LIFTING HEIGHT

95 m (312 ft) above work deck for each crane. Lowering depth of auxiliary hoists 460 m (1,500 ft) below work deck at minimum radius.

MAIN HOIST DEEPWATER MODE

Main hoist: 900 t with hook at 850 m water depth up to 128 m above the water line. Special main hoist block: 1,025 t at 847 m water depth. Deep water blocks: 414 t at 2,741 m water depth (all based on main hoist at minimal radius and 26.6 m operating draft).

DYNAMIC POSITIONING SYSTEM

The Thialf is equipped with an NMD Class III Dynamic Positioning system with the following characteristics:

Thrusters

6 x 5,500 kW - 360 degrees azimuth, total thrust 420 t

Modes of Operation

- Manual
- Joy-stick
- Auto-pilot
- Auto DP mode
- Position mooring

Special DP functions

- Heavy lift
- Follow target
- External force compensation

Position reference systems

- 2x Satellite DGPS with 5 aerials
- 1x Mechanical taut wire (300m)
- 1x Artemis
- 2x Acoustic SSBL/LBL
- 1x Fan-beam laser
- 1x Tautwire system

Dimensions

Length overall	201.6 m	661 ft
Width	88.4 m	290 ft
Depth to work deck	49.5 m	162 ft
Draft	11.9 - 31.6 m	43 - 104 ft
GRT	136,709 t	-
NRT	41,012 t	-

Portside and starboard crane	**Load**	**Outreach**
Main hoist	7,100 t	up to 31.2 m (102 ft)
Auxiliary hoist	907 t	36.0 - 79.2 m (120 - 260 ft)
Whip hoist	200 t	41.0 - 129.5 m (134 - 430 ft)

Balder

Balder is a Semi Submersible Crane Vessel (SSCV) and is capable to execute a tandem lift of 6,300 T. The cranes provide for a depth reach lowering capability as well as a heavy lift capacity to install topsides. This multi-functional dynamic positioned DCV is tailored for the installation of foundations, moorings, SPARs, TLPs, and integrated topsides.

Accommodation / helicopter deck
The living quarters can accommodate 394 men. The helicopter deck is suitable for a Sikorsky S-92.

Life-saving / fire-fighting
Life-saving and fire-fighting equipment according to the latest Class and IMO requirements.

Ballast system
Static and dynamic ballast system both fully computer supported. Ballast pump capacity 8,000 m3 per hour. Dynamic ballast water handling 250 t per second.

Deck load
- up to 10 t / m^2
- Total capacity 8,000 t

Dynamic positioning system
The Balder is equipped with a full Class III Dynamic Positioning system with the following characteristics:

Thrusters
7 x 3,500 kW - 360 degrees azimuth

Propulsion
2 x 4,400 kW - controllable pitch

Modes of operation
- Manual
- Joy-stick
- Auto-pilot
- Full DP mode
- Full anchor mode

Special DP functions
- Track follow
- Heavy lift
- Follow floating
- External force compensation

Position reference systems
- 2 x Satellite DGPS with anti-masking system
- 1 x Mechanical taut wire (500m)
- 1 x Artemis
- 2 x Acoustic SSBL/LBL
- 1 x Fan-beam laser
- Radius

Tool box feature

Typical deepwater installation activity	Dynamic positioning	Starboard crane with traction winches	Portside crane with fly-jib	Mooring line Deployment Winch	A&R Winch	Underwater hammers with girdle power pack
Mooring line deployment	+	+		+		
Deepwater pile installation	+	+				+
Deepwater structures lowering	+	+	(+)	(+)	(+)	
Facilities and topsides installation	+	+	+			

Dimensions

Length overall	154 m	505 ft
Length of vessel	137 m	450 ft
Width overall	106 m	346 ft
Width vessel	86 m	282 ft
Depth to work deck	42 m	138 ft
Draft	11 to 25 m	36 to 104 ft
GRT	75,374 t	-
NRT	22,612 t	-

Portside crane	Load	Outreach in m	Outreach in ft
Main hoist guyed	2,721 t	23 – 65 m	75 – 213 ft
Main hoist revolving	1,995 t	23 – 90 m	75 – 295 ft
Auxiliary hoist	997 t	29 – 123 m	95 – 404 ft
Whip hoist	72 / 226 t	31 – 127 m	102 – 417 ft

Starboard crane	Load	Outreach in m	Outreach in ft
Main hoist guyed	3,628 t	24 – 52 m	79 – 171 ft
Main hoist revolving	2,993 t	24 – 80 m	79 – 262 ft
1st Auxiliary hoist	907 t	28 – 91 m	92 – 299 ft
2nd Auxiliary hoist	598 t	31 – 100 m	102 – 328 ft
Whip hoist	72 / 226 t	36 – 114 m	118 – 374 ft

Mooring Line Deployment Winch

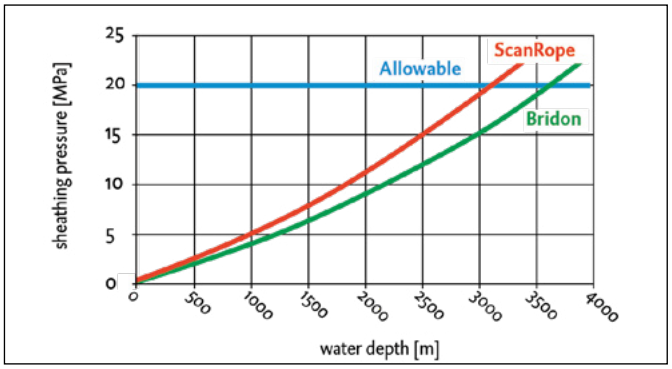
The Mooring Line Deployment Winch has been designed specifically for the deployment of sensitive sheathed spiral strand wire or fibre rope moorings in deepwater.

Features

- Control from the bridge, in close co-operation with DP operator
- Constant tension facility
- Load monitoring
- Length monitoring
- Winch can be tilted to facilitate correct spooling

Sheathing pressure

Due to its large diameter, sheathing pressures are extremely low. Even with the heaviest mooring lines and the most conservative rules, safe installation down to 3,000 m and more is possible.



Lowering & Pick-up wire

Length	3800 m
Diameter	102 mm (4”)
MBL	775 t

Drum dimensions

Drum diameter	10.5 m
Drum length	10.0 m
Storage capacity	1,800 m of 6” sheathed spiral strand wire 2,400 m 4.5” sheathed spiral strand wire
Safe working load	2,75
Lowering/hoisting speed	20 m/min

Aegir

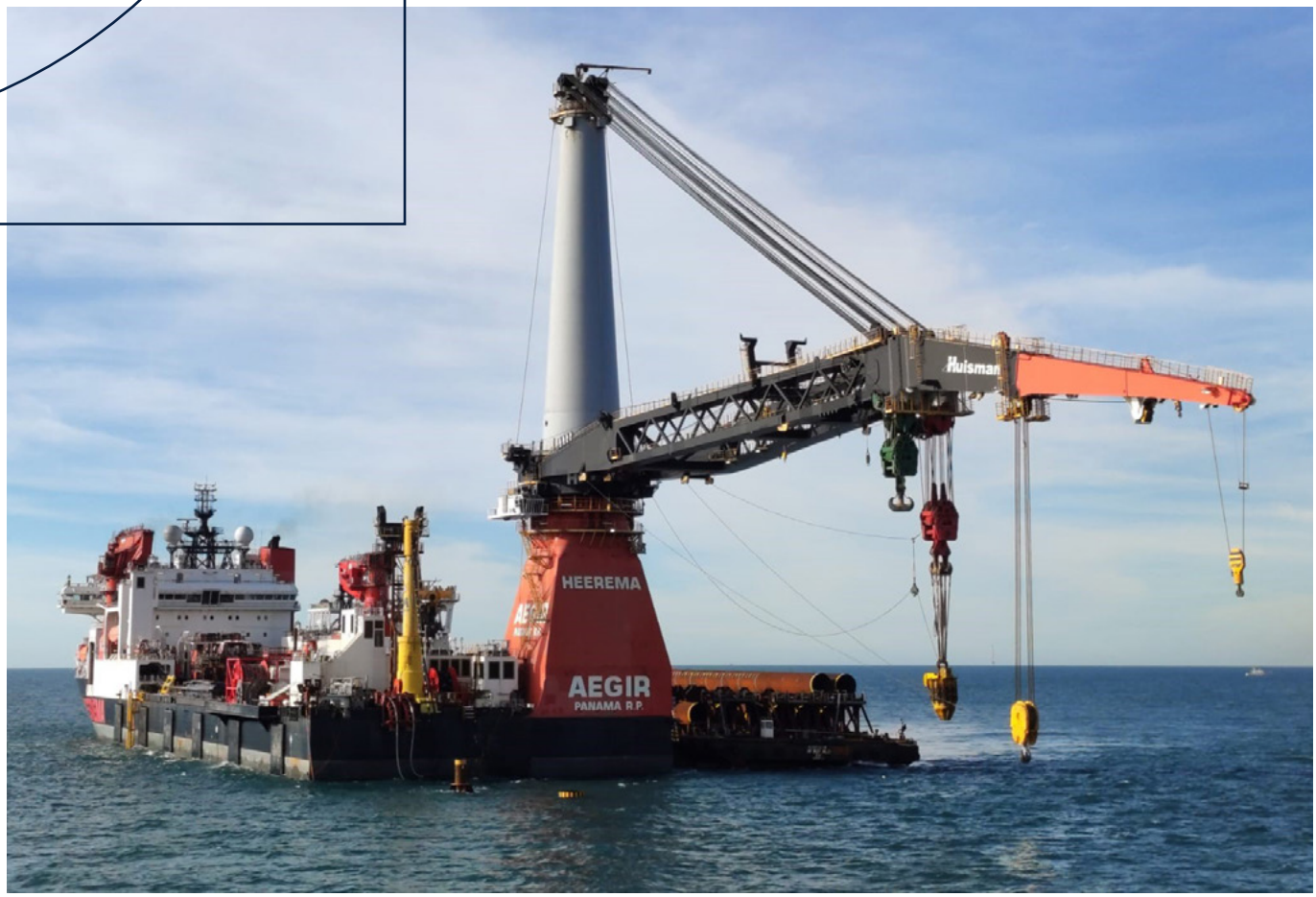
As a fast-moving heavy lift vessel, Aegir offers unique offshore transport, installation, and removal solutions.
Aegir is one of the world's largest monohull crane vessel and has a proven track record across a wide range of offshore projects. Optimized for fast transit speed, Aegir can mobilize worldwide and work in any water depth.

Due to Aegir's retractable thrusters, shallow draft, and extensive clear deck space, the vessel has the possibility to load-out directly from the quayside and transport on deck, reducing both yard and transport costs.

While on location, Aegir's DP3 dynamic positioning system provides accurate and stable positioning. The vessel has a lifting capacity of 5.000 metric tons, and the option to use a split main crane block offers flexibility by allowing the upending of tall structures and long piles, similar to our dual crane vessels.

TRACK RECORD HIGHLIGHTS

Aegir has transported and installed various jackets, topsides, and modules. In 2017, the vessel installed sixteen anchor piles and mooring lines for the Shell Prelude FLNG using a novel pile installation method. In 2020, Aegir completed the jacket installation, as well as the 3100 metric ton topside installation for Qatargas' North Field Bravo Living Quarters Expansion project. Aegir's lifting capacity and speed were recently upgraded to make the vessel even more competitive for projects anywhere in the world.



General Description

Design	Ulstein Sea of Solutions customized SOC 5000 design
Dimensions	Length 211 m x width 46 m
Operating draft	9 – 11 m
Transit draft	8 m

Heavy lift crane

Type	Revolving mast type crane
Boom length	125 m
Capacity revolving	5,000 mT between 18-33m radius 1,500mT at 75m radius
Lifting Height main hoist	96 m above main deck
Maximum radius	79 m
Auxiliary Hoist	750mT between 23 – 85m radius, or 300mT up to 110m radius
Whip hoist	110 mT between 31 – 123 m radius

Auxiliary Cranes

Deck cranes	Two (2) knuckle boom cranes, each 40 mT SWL at 20 m radius and 5 mT at 40 m radius. Man riding certified

Deep water lowering system

Capacity	3,500 m waterdepth, active and passive heave compensation up to 750 mT
A&R system	2,000 mT max 3,500 m water depth

ROVs and LARS

ROV	Two (2) ROV work class systems, launched from ROV hangars at starboard and portside
LARS	Two (2) launch and recovery systems inside the ROV hangars suitable for 3,500m waterdepth

Accommodation / helicopter deck

The living quarters can accommodate 305 persons in single and double cabins. All cabins have heating and air conditioning facilities. The helicopter deck is suitable for Augusta Westland EH101 or Sikorsky S-92 helicopter, compliant with IMO, LR and NMA and CAP437 requirements.

Life-saving / fire-fighting

Life-saving and fire-fighting equipment have been provided for according to the latest class, IMO and NMA standards.

Dynamic Positioning system

The Aegir is equipped with a full Class III Dynamic Positioning system.

Thrusters

2 x 6,500 kW fixed pitch, variable speed azimuth thrusters for main propulsion and for DP 4 x 3,200 kW fixed pitch, variable speed, retractable azimuth thrusters and 1 x 2,500 kW fixed pitch, variable speed tunnel thruster for DP and manoeuvring.

Power supply

The Aegir is equipped with a 48 mW total main power plant comprising of 6 diesel generators rated at 8,000 kW each and 1 emergency diesel generator set rated at 1,731 kW.

Pile Driving Hammers

HMC owns and operates a complete range of hydraulic hammers including the heaviest and the deepest operational water depth of the world. All these hammers are suitable for pile driving both above and under water. The energy output is continuously variable between 30 and 100 %.

MHU-3500
The most recent addition to HMC's spread of underwater hammers is the MHU-3500 hammer. This is the strongest and heaviest hydraulic hammer in the world with an energy output of 3500 kN and suitable to drive at up to 500 m waterdepth.

MHU-500 T Spread
This HMC deepwater pile driving spread is suitable to drive piles at up to 2,200 m water depth. The spread consists of 2 x MHU-500T hammers which deliver at least 475 kNm at a maximum waterdepth. The hammers are driven by means of a hydraulic girdle powerpack installed around it.

The electrical pumps on the powerpack are powered from the surface with a 1,600 m or 3,000 m electrical umbilical deployed from a dedicated winch. The spread is now ready to be upgraded to an operational water depth of 3,000 m. The delivery of the 3,000 m umbilical is part of this upgrade.

Pile Driving Hammers

	Netto Energy in Pile (kNm)	Max. Pile Diameter (inch)	Submerged Weight (t)
MHU-270T (2x)	270	36/72	45
S-400 (2x)	400	54/72/96	57/59/70
MHU-500T (2x)	525	84	61
MHU-600iS (2x)	600	48/96	97/122
MHU-1700i (2x)	1,700	96	287
MHU-2100iS (2x)	2,100	108	276
S-2300 (1x)	2,300	108	323
MHU-3500iS (1x)	3,500	108	343

Support Equipment

HMC operates a large variety of marine equipment:

- Anchor handling tugs
- Cargo barges
- Cargo / launch barges
- Offshore pile driving hammers

Anchor handing tugs

	Length	Width	Depth (work deck)	Summer draft	Bollard pull
Bylgia	72.0 m (236 ft)	18.0 m (59 ft)	8.5 m (27 ft)	7.37 m (24 ft)	199 t
Kolga	72.0 m (236 ft)	18.0 m (59 ft)	8.5 m (27 ft)	7.37 m (24 ft)	203 t

Cargo / launch / float-over barges

	Length	Width	Depth	Deadweight	Max. launching capacity
H-302	91.5 m (300 ft)	27.5 m (90 ft)	5.5 m (18 ft)	8,580 t	-
H-405	122.0 m (400 ft)	36.6 m (120 ft)	7.6 m (25 ft)	20,437 t	-
H-406	122.0 m (400 ft)	36.6 m (120 ft)	7.6 m (25 ft)	20,115 t	-
H-407	122.0 m (400 ft)	36.6 m (120 ft)	7.6 m (25 ft)	19,929 t	-
H-408	122.0 m (400 ft)	36.6 m (120 ft)	7.6 m (25 ft)	19,929 t	-
H-541	165.0 m (540 ft)	42.0 m (138 ft)	10.7 m (35 ft)	41,947 t	20,500 t
H-542	165.0 m (540 ft)	42.0 m (138 ft)	10.7 m (35 ft)	41,177 t	20,500 t
H-591	180.0 m (590 ft)	46.0 m (150 ft)	11.7 m (38 ft)	52,034 t	24,000 t
H-627	176.8 m (580 ft)	48.8 m (160 ft)	11.0 m (36 ft)	52,919 t	26,000 t
H-851	260.0 m (853 ft)	63.0 m (207 ft)	15.0 m (49 ft)	110,720 t	40,000 t

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